

## Connecting the Dots: Engineering, Economics & Education

In 2009/10, 6.3 % of UK first year undergraduates were starting courses in Engineering and Technology.<sup>1</sup> This percentage allowed the sector to come seventh, a ranking that is sure to trouble politicians, industry leaders, and engineers themselves. In 2008, Professor Paul Acarley said: *“Leading UK companies are finding it a real challenge to fill engineering positions as the vast majority of students graduating from our universities do so from non-engineering courses. There is a looming skills shortage in a critical area of this nation's overall industrial output.”*<sup>2</sup> A view from the general populace is that British industry has waned in their lifetime,<sup>3</sup> and amidst the inescapable financial turmoil of current times, this observation is a cause of concern and painful nostalgia among current business leaders, the very same who disapprove of the current statistics. What has caused this historical industrial shift in Britain, and how can our modern education system turn it around?

The slow deindustrialization of Britain can be witnessed from the 1960s onwards. When Margaret Thatcher's Conservative Government came to power, manufacturing accounted for around 30% of the national income and employed about 6.8 million people. Thatcher saw the future of Britain in the competitive global market, emphasising the private sector and its ability to conform to compete at a global level, specifically shifting priority from manufacturing to the financial services industry. After decades of similar thinking, the current figure for manufacturing stands at an 11% contribution to the national income.<sup>4</sup> A major contributor to the political thinking that caused this shift is the advent of the *‘Information Age’*,<sup>5</sup> a name for the current industrial environment, altered by the increased usage of ICT in society. This technology has had major impact on the financial sector, allowing greater complexity in product, analysis and scope, resulting in the globalization and deregulation of the current market. This emphasis on the financial services sector has shifted Britain's brightest away from science and engineering and towards the major financial firms. Looking at the state of the UK economy, it could be argued that Britain has adapted poorly to this new industrial climate. Many believe the key to returning Britain to its industrial form lies in education.

However, education holds some of the blame for the stagnation of Britain's output. The current State education we see today was built during the industrial revolution, designed to take the English youth and turn them into English employees, teaching them the necessary skills in Mathematics, English, Science and others to operate confidently in the working environment. The issue now is this system is becoming too efficient at its purpose. The system of examinations and textbooks are producing large batches of high grade product, but all this means is that Universities and Employers don't know who to pick. *‘Grade Inflation’*,<sup>6</sup> the term describing the increased rewarding of top grades, is often seen as the result of using privatised exam boards, who naturally would lower standards to increase business. This illusion of standard has had adverse effects, in a report by The University of Birmingham investigating the lack of good Science and Engineering graduates, it reads: *“Perhaps, because of recent initiatives, there seem to be too many people studying science for the labour market to cope with, or perhaps graduates are no longer of sufficient quality.”*<sup>7</sup>

To create those of sufficient quality for Engineering, schools should be looking for the true strength of engineering, the *application* of knowledge. Experience should lay at the foundation of modern education, because without the experience of how the theory works, the theory can lose its meaning. Engineers must also further distance themselves from the machines they may make; it should be acknowledged that (to an extent), computers have changed what we need to know. Machines can spell-check and calculate far better than we ever will, so we should embrace our illogical side as much as the logical. Creativity is thrown around quite a lot these days, but not many fully realise what it means. It's not always a matter of brainstorming and drawing lines outside of the dotted box. In an interview with Wired Magazine, Steve Jobs, founder of Apple Computers, said: *“Creativity is just connecting things. When you ask creative people how they did something, they feel a little guilty*

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<sup>1</sup> Patterns and Trends in UK Higher Education *Universities UK* (2011)

<sup>2</sup> CBI sounds alarm at lack of engineering graduates *The Independent* (2008)

<sup>3</sup> Why doesn't Britain make things any more? *The Guardian* (2011)

<sup>4</sup> Ibid.

<sup>5</sup> The Information Age *Wikipedia Entry*

<sup>6</sup> Grade Inflation *Wikipedia Entry*

<sup>7</sup> Engineering graduates 'taking unskilled jobs' *BBC News* (2011)

*because they didn't really do it, they just saw something. It seemed obvious to them after a while. That's because they were able to connect experiences they've had and synthesize new things. And the reason they were able to do that was that they've had more experiences or they have thought more about their experiences than other people. Unfortunately, that's too rare a commodity. A lot of people in our industry haven't had very diverse experiences. So they don't have enough dots to connect, and they end up with very linear solutions without a broad perspective on the problem...*<sup>8</sup> Jobs dropped out of college and visited creative arts lectures instead, developing his interest in typography, an interest that would pay off immensely when designing a personal computer: *"If I had never dropped in on that single calligraphy course in college, the Mac would have never had multiple typefaces or proportionally spaced fonts."*<sup>9</sup> This focus on typography helped define the personal computer as a highly functional word processor, which led the way for its current huge domestic and industrial presence, a perfect example of the benefits of being a well-rounded engineer.

A focus on creativity is essential in modern industry, last year the Smartphone App Instagram was bought for \$1 Billion in cash and stock by Facebook<sup>10</sup>. The app allows users to reinvent their mobile phone photos in the style of vintage Polaroid prints. Many don't understand the value in something that sends an expensive piece of technology back to the 1970s, but that's the nature of today's market. The history of Engineering is littered with vocal luddites laughing at the face of the future, from Sextus Julius Frontius, Chief Military Engineer during the reign of the Emperor Trajan, 98-110 AD, saying: *"I will ignore all ideas for new works and engines of war, the invention of which has reached its limits and for whose improvement I see no further hope."*<sup>11</sup> to Steve Balmer, Microsoft CEO, saying in 2007: *'There's no chance that the iPhone is going to get any significant market share. No chance.'*<sup>12</sup> In the quarter ending March 31, 2012, iPhone had sales of \$22.7 billion; Microsoft Corporation, \$17.4 billion.<sup>13</sup> We don't know what tomorrow's market or technology will be like, but we know what's available today; and it requires Engineers with the confidence and ability to turn that present into the future.

Where are these future Engineers going to develop these skills? School. In a TED talk, Sir Ken Robinson talked about how the current education system and said: *"If you think about it the whole system around the world is a protracted process of university entrance. And the consequence is that many highly talented, brilliant, creative people think they're not. Because the thing they were good at at school wasn't valued, or was actually stigmatized."*<sup>14</sup> He talks about how the current education system ostracizes creative ability through its disgracing of failure and its rigorous implementation of a 'syllabus' that generally supports uniform learning over personal exploration. He also makes the point that *"Children starting school this year (2010) will be retiring around 2075. Nobody has a clue what the world will look like in five years' time, let alone in twelve years... We have no idea what that future will bring... and yet we're supposed to be preparing them for that."* Schools should give their students the self-confidence to go out and achieve what they want, so when their application sheet is on the table, they are not judged on a series of letters and numbers. In the advent of internet-based non-profit educational organisations such as Khan Academy, it's never been easier to make "make oneself". All that's in the way is social stigma.

In conclusion, Britain's children need to be treated as a resource to refine rather than a canvas to imprint upon. A modern business is often built from one idea rather than a thousand hands, so our education system should acknowledge this, developing passions, thinking skills and experiences. For Britain to improve its industrial performance, it should move away from the Information Age pipe dream as a centre of services, because in reality making money by making money is not dependable, producing work of value is. Ultimately, Britain needs to acknowledge the creative potential of their children, so they can connect the dots from an Information Age to a new Technological one.

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<sup>8</sup> Pg. 199 December Issue *Wired UK* (2011)

<sup>9</sup> 'You've got to find what you love,' Jobs says *Stanford Report* (2005)

<sup>10</sup> Facebook buys Instagram photo sharing network for \$1bn *BBC News* (2012)

<sup>11</sup> 'Foresight Through the Centuries' Pg. 2 **Organisation for Economic Co-Operation and Development**

<sup>12</sup> Here's What Steve Ballmer Thought About The iPhone Five Years Ago *Business Insider* (2012)

<sup>13</sup> Apple's iPhone Is Now Worth More Than All Of Microsoft *Forbes.com* (2012)

<sup>14</sup> Ken Robinson says schools kill creativity *TED* (2010)

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