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Principal's Blog

FROM STEM TO STEAM

“If we teach today's students as we taught yesterday's, we rob them of tomorrow”

John Dewey

John Dewey was an [American philosopher](#), [psychologist](#), and [educational reformer](#) who lived in the first half of the 21st century. However, his words were prophetic. He understood that as the world evolves, the education system needs to keep pace and even be ahead of the current global economic needs.

At the conference for Microsoft Showcase School Leaders at the end of September in Dublin, we had the opportunity to meet with other schools who are embracing technology in order to ensure that the curriculum and education experience remains relevant for our students. We were fortunate to hear about good practice from other school leaders and representatives from the digital technology industry. We were told that we are in the midst of the fourth industrial revolution, that 40% of the jobs on the market today will disappear in the next 5-10 years and that 65% of the jobs our Year 1 pupils will do, do not yet exist. Indeed, one speaker informed us that researchers believe that there will be 1.3 million unfilled jobs in cloud related fields by 2020.

There are a group of companies now, affectionately named the 'Unicorn Club' (due to their initial rarity) which are worth over \$1 billion. Many of these are online start-ups, who avoid the traditional route of building a business slowly through capital investment. Their on-costs, in terms of buildings and capex are very low. They are developed on the back of the internet and social media. The most recent addition to the Unicorn Club was Dropbox in March 2018 but other more famous members are Google, Facebook, Apple. Indeed, if you consider some recently successful companies you discover they do not actually own any things; Uber has no cars for example and AirBnB owns no hotels. So, if

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we continue to presume that our children will study for and enter the same career paths we did (lawyers, doctors, accountants, teachers, business and banking) then we are inevitably selling them short. These professions may well continue to exist but will require a deeper understanding of digital technology; there will be more robots involved in medical surgery and treatments, there will be a need to understand the complexity of the digital world for corporate lawyers supporting companies in this field, finance and engineering will be underpinned by digital solutions and education will certainly be enhanced by using digital learning platforms.

So, what is the fourth revolution? And what were the first three?

- The First Industrial Revolution took place from the 18th to 19th centuries in Europe and America. It was a period when mostly rural societies became industrial and urban. The iron and textile industries, along with the development of the steam engine, played central roles.
- The Second Industrial Revolution took place between 1870 and 1914, just before World War I. It was a period of growth for pre-existing industries and expansion of new ones, such as steel, oil and electricity, and used electric power to create mass production. Major technological advances during this period included the telephone and the internal combustion engine.
- The Third Industrial Revolution, or the Digital Revolution, refers to the advancement of technology from analogue electronic and mechanical devices to the digital technology available today. The era started during the 1980s and is ongoing. Advancements during the Third Industrial Revolution include the personal computer, the internet, and information and communications technology (ICT)
- The Fourth Industrial Revolution builds on the Digital Revolution, representing new ways in which technology can become embedded within societies and even the human body. It is marked by emerging technology breakthroughs in a number of fields, including robotics, artificial intelligence, nanotechnology, quantum computing, biotechnology, The Internet of Things (IoT), 3D printing and autonomous vehicles.

In his book, *The Fourth Industrial Revolution*, professor Klaus Schwab, founder and executive chairman of the World Economic Forum, describes how this fourth revolution is fundamentally different from the previous three however, which were characterized

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mainly by advances in technology. The underlying basis for 4IR lies in advances in communication and connectivity rather than technology. Katri Saarikivi (a Cognitive Neuro Scientist at the university of Helsinki) maintains that this digital transformation will only be successful if new developments in technology are combined with people working collaboratively and creatively and that the preparation ground for this lies in a transformed education system. Ken Robinson's (Educationalist and Professor Emeritus at the University of Warwick) position has always been that creativity is undervalued in schools and by teachers and parents who focus on the traditional academic subjects as a priority. He believes that we need to actively teach and encourage creativity, especially in secondary education where it becomes more peripheral than in primary classrooms.

Most people have heard of the phrase STEM. This is an acronym which describes the academic disciplines of Science Technology Engineering and Maths. The Artificial Intelligence Conference attended by 5 of our students in Athens in August was a STEM event to encourage girls to consider careers in these traditionally male career paths. Organised by Microsoft, it welcomed 160 girls from countries all over Central and Eastern Europe, on the basis that such large companies want to attract a balanced work force of both male and female minds and expertise. However, at that conference there was also a great focus on creativity. There is now a new movement emerging; STEAM.

STEAM is a movement championed by Rhode Island School of Design (RISD) and has been widely adopted by institutions, corporations and individuals all over the world. It relates to Science Technology Engineering ARTS and Mathematics.

The objectives of the STEAM movement are to:

- transform research policy to place Art + Design at the centre of STEM
- encourage integration of Art + Design in K–20 education
- influence employers to hire artists and designers to drive innovation

Geoff Barton who is the General Secretary of the Association of School and College Leaders in the UK has written extensively on this topic. He points out that over the last few years the uptake of arts subjects at IGCSE and A level has declined markedly. The proportion of pupils taking at least one arts subject declined from 57.1 per cent in 2014

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to 53.5 per cent in 2016. A new curriculum expectation introduced by the UK government as mandatory in state schools from 2015 (known as the EBACC or English Baccalaureate) required all pupils to study a science, Maths, English, a foreign language and a humanity subject. This was an attempt to move away from a dumbed down curriculum where pupils chose very similar subjects or did not include enough breadth in their GCSE choices. However, as a side effect, it failed to include a requirement for an arts subject. So, disciplines such as music, art, drama or even a second foreign language were hit hard.

Barton states;

*'Show me a great school and I'll show you a rich pulsing culture of the arts at its core
Teachers must continue to shout out about the liberating, humanising, intoxicating power
of the arts'*

Geoff Barton 2017

At The Junior & Senior School we constantly strive to keep in touch with the developing world around us and to make the curriculum relevant for our pupils. As a Microsoft Showcase School, we are embracing the digital revolution and finding all sorts of opportunities to immerse children in a world of AI and the internet of things. We do this via visits such as the one to the AI conference in Athens in September, by staff training (colleagues are visiting other schools in Europe who are further down the line than we are in digital learning and attending relevant conferences e.g. BETT in London) to gain ideas to bring to our classrooms and in the transformation of our curriculum ; with new ways of teaching and new extra-curricular provision in fourth industrial revolution phenomena and beginning to share resources and information on our Office 365 learning platform we are beginning to transform children's learning. We are developing project-based learning especially at KS1-3 and subjects are collaborating to ensure a joined up curriculum. However, we also value creativity and the arts. Our school offers many opportunities to study the arts and also take part in performances and exhibitions. Talent Nights, Christmas concerts, school drama pieces and musicals, art competitions and exhibitions, entrepreneurship competitions such as Junior Achievement, are all mechanisms to nurture creativity and collaboration. We are the only school in Nicosia to offer A level Drama as part of our core curriculum and numbers choosing music and art

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in IGCSE and A level remain robust. At the same time Mathematics continues to be our most popular A level and we have enhanced our STEM curriculum with Further Maths IGCSE and A level, robotics elements in the KS3 and after school curriculum and programming and coding at KS2. We have a specialist ICT teacher, teaching pupils in Years 5 and 6 and two of our physics teachers will be attending international staff training on the 'Hacking STEM' later this month in Prague.

At the start of the 21st century, educators began to develop the idea of basic skills they felt were key to the development of young people and ensure readiness for the adult world. These ultimately became the 4Cs; Critical thinking, Creativity, Collaboration and Communication. STEAM covers all of these areas and is the new platform to re-launch them.

My conclusion mirrors my introduction. Education must constantly evolve for the world it serves. Curriculum provision and careers education is central to this evolution. However, critical thinking, creativity, collaboration and communication are at the core of human endeavour and we should continue to develop, encourage and enhance these vital skills with our children to allow them to have an exciting and fulfilling future.

<https://www.youtube.com/watch?v=vSAX|CPC5C4>

Thank you,

Deborah Duncan

Principal

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