

# **Education Trust STEM Strategy**

**2016-2021**

**(Science, Technology, Engineering and Mathematics)**

**Stoke-on-Trent and Staffordshire  
Local Enterprise Partnership**

**July 2016**

## Foreword

The Stoke-on-Trent and Staffordshire Enterprise Partnership Strategic Economic Plan aims to grow the economy by 50% and generate 50,000 new jobs over 10 years to 2021 (50:50:10).

To realise this the Stoke-on-Trent and Staffordshire LEP is building on the region's strong transport links, educational institutions and high quality of life to ensure that Stoke-on-Trent and Staffordshire continues to be an attractive place to live, work and do business.

The Stoke on Trent and Staffordshire LEP has set out in the Strategic Economic Plan the key sectors that will drive economic growth, new jobs and wealth creation in our localities. The LEP has identified STEM as one of the sectors with the greatest potential for growth. Access to and engagement with STEM by education stakeholders, businesses and other key partners can lead to a shared programme of work and activity that gives visibility and status to the STEM activity across the LEP area.

The importance of STEM subjects to the national and local economy is well known and understood. There is significant research that sets out the challenge of securing sufficient quality and quantity of the STEM and employability skills that businesses need to grow. Individuals will benefit from investing in and honing STEM skills as the keys to accessing high value jobs where there are well-documented shortages and growing demand.

The Education Trust STEM Strategy provides the opportunity to achieve a joined up and effective education and skills pathway into engineering, science and technology careers and by doing so strengthen the economic position of Stoke-on-Trent and Staffordshire. Without such a coherent, managed approach we would continue to implement ad-hoc actions not necessarily meeting industry or economy needs, and consequently, we may miss opportunities to build the local economy and not make the best use of public finances. If well managed, coordinated and implemented with the engagement of the correct agencies we will address inequalities and gender imbalance.

Through a strong collaborative and partnership focus the LEP Education Trust Skills Strategy Group will target delivery around Employers, Apprenticeships and education providers. Our aim is that Stoke-on-Trent and Staffordshire become exemplar in getting more people into sciences and engineering, growing indigenous companies and attracting new businesses. Having a talented workforce is critical to the future success of the Stoke-on-Trent and Staffordshire economy.

Ken Stepney

**Chair, Stoke-on-Trent and Staffordshire Education Trust**

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## **1. Background**

In early 2015 in response to requests from partners and stakeholders, a series of short meetings were arranged chaired by Staffordshire County Council, to revisit the STEM agenda in Staffordshire and to investigate further opportunities to raise the profile of STEM in the context of its strategic importance both locally and within Government. The attendees of the meetings largely consisted of colleagues who sat on the STEMNET management board and included representatives from Entrust, the council and local employers. Positive progress was made and the early version of a STEM strategy began to take shape.

Alongside these meetings the Entrust STEM team chaired an established employers group that shared similar attendees and agenda. In the latter part of 2015, it was agreed to merge the two groups to create the STEM Strategy Group. The initial key objective of the group was to develop a STEM strategy and to inform this process a mapping exercise was conducted to seek clarity on the current initiatives delivered by partners to promote the STEM agenda. Alongside this exercise a strategic data analysis was also conducted. This STEM strategy is an outcome of this process.

## **2. What is a STEM Strategy?**

It is a coherent strategic approach, driven by local employer workforce requirements, to ensure that the education and skills in Stoke-on-Trent and Staffordshire are able to deliver growth and success within science, technology, engineering and maths (STEM) related industries.

It will direct educational policy on student subject opportunities, information, advice and guidance (IAG), curriculum design and delivery. It will enable students to understand and make the best subject choices for their studies. We aim to have significant numbers of young people leaving education with the skills and learning suitable to grow a successful, enterprising and exciting economy in Stoke-on-Trent and Staffordshire. In doing so, we will reduce the skills gaps and shortages in engineering and advanced manufacturing.

We want to achieve a joined up and effective education and skills pathway into engineering, science and technology careers and by doing so strengthen the economic position of Stoke-on-Trent and Staffordshire. Without such a coherent, managed approach we would continue to implement ad-hoc actions not necessarily meeting industry or economy needs, and consequently, we may miss opportunities to build the local economy and not make the best use of public finances. If well managed, coordinated and implemented with the engagement of the correct agencies we will address inequalities and gender imbalance.

Our aim is that Stoke-on-Trent and Staffordshire become exemplar in getting more people into sciences and engineering, growing indigenous companies and attracting new businesses. Having a talented workforce is critical to the future success of the Stoke-on-Trent and Staffordshire economy.

### 3. Vision and Purpose

The vision for this Strategy is to

*“Inspire the innovators, entrepreneurs and leaders of tomorrow....”*

With a mission

*“To inspire young people’s and adults’ choices and empower future generations through Science, Technology, Engineering and Mathematics to skill Staffordshire’s vibrant and innovative developing economy”*

Within and directly supporting the wider Stoke-on-Trent and Staffordshire Local Enterprise Partnership (LEP) Education Trust Strategy is the clear identification and collective focus on STEM as one of the priority sectors with the greatest potential for growth.

There are four dimensions to the STEM strategy locally that will be pivotal to the development and success of the local STEM approach:

- **STEM Inspiration** – to inspire, attract and raise the aspirations of children, young people and adults in regard to STEM subjects and skills, for example through STEM ambassadors and local champions.
- **STEM Pathways** – to offer sound guidance and information on qualifications, career choices and options that support STEM, for example through careers IAG, work experience and progression planning.
- **STEM Infrastructure and Curriculum** – to secure the right assets to support specialist delivery and support shared local access to assets and infrastructure in order that the right curriculum can be delivered to align with industry need, for example through skill centre investment.
- **STEM Teaching and Learning** – to ensure high quality materials for teaching and industry -appropriate learning experiences for student, providing relevant context and purposeful learning to enable progression into work or higher level study.

This strategy presents a major opportunity for businesses in Stoke-on-Trent and Staffordshire to improve their competitiveness through developing the skills of their workforce, in the STEM sector.

## 4. National and Local Context

### National

In its 2011 report, The Plan for Growth<sup>1</sup>, the Government pronounced education “the foundation of future economic success”. It highlighted the importance of science and mathematics and the key role to be played by STEM in driving innovation, growth and economic recovery.

The skills gaps and shortages are well documented in the engineering and advanced manufacturing sector, with over 40% of employers experiencing labour shortages. In the UK more than eight million people are employed in the engineering and manufacturing industries. This makes the UK the seventh largest manufacturing nation in the world. Talented engineers, technicians and managers are vital to the future success of the engineering and advanced manufacturing sector.

A report by the UK Commission for Employment and Skills (UKCES) revealed that 43% of STEM vacancies are hard to fill, due to skills shortages, compared to a UK average of 24% for other difficult to fill roles

It also found that high level STEM workers are less likely to receive training than their counterparts in other roles, indicating that employers must invest more in developing the skills of these workers. According to the report, five million people are employed in high level STEM roles, making these skills crucial to the success of the UK economy, in terms of jobs, productivity, innovation and competitiveness.

The UKCES report made a number of recommendations for employers, including that they consider higher apprenticeships to help develop defined career pathways within STEM occupations, as well as ensure they widen the talent pool available to them by making these occupations more attractive to women.<sup>2</sup>

A recent Organisation for Economic Co-operation and Development (OCED) report showed the UK could increase GDP by 3.1% from 2030 if teenagers developed basic educational skills in science, maths and reading. The reason that STEM jobs are important to the local economy is that these jobs are across a wide variety of industries and the lack of professionals in STEM can hit different industries, from banks, tertiary education to software industry.<sup>3</sup>

There is clear evidence of a widening gender gap from information published by the Universities and Colleges Admissions Service (UCAS). It shows that while men still dominate in areas traditionally seen as male, such as engineering, computer science and sciences, applications from women now outnumber men in around two-thirds of degree subjects. It suggests that female 18-year-old pupils are now over a third more likely to start a degree course than their male counterparts, and those from poorer backgrounds are more than 50% more likely to enter university. Overall, around 66,800 more women than men are currently studying on a degree courses.

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<sup>1</sup>HM Treasury, The Plan for Growth, 2011

<sup>2</sup> UKCES, Sector insights: skills and performance challenges in the advanced manufacturing sector – Evidence Report 93, 2015

<sup>3</sup> Active Informatics, 2015

During the last few years it has been widely recognised that over the previous 20 years Information and Communication Technologies (ICT) education in British schools has been largely ineffectual. The schools system focused on training children to use outdated software instead of embracing computer science – giving children the opportunity to programme, understand key concepts of networks, problem solving and write algorithms.

In the last two years there has been a significant step-change by Government to ensure that school children at Key Stages 1 and 2 become digitally literate, with pupils able to use, and express themselves and develop their ideas through ICT. The impact of this change is yet to be assessed but it is likely those pupils that learn to ‘code’ from an early age will have valuable STEM skills which will help to reverse the decline in university applicants for computer science courses and create a more attractive workforce for employers.

Within schools a number of key subjects, including STEM subjects, have a deficiency in teachers and the recruitment of new teachers is becoming increasingly more difficult. Figures from UCAS for 2015/16 reveal major shortfalls in trainee teacher numbers in sciences<sup>4</sup> despite the Government offering bursaries to graduates to encourage them into teaching. The Department for Education statistics<sup>5</sup> for 2015/16 show a shortfall in recruitment to Initial Teacher Training programmes, against target figures, of 59% for Design and Technology teachers and 30% for Computer Science teachers. Overall, Sciences had a 15% shortfall in Initial teacher training recruits and Mathematics a shortfall of 7%. Also around an additional 500,000 pupils are due to enter the school system over the next five years placing schools under increasing pressure. These factors could potentially lead to inequalities in education and a lack of opportunity to study STEM subjects past GCSE level.

Recently the Government has reformed the content of GCSE and A level courses so that they are more rigorous and more knowledge-based. From September 2017 the grading system for GCSEs is also changing to a number based system with 9 being the highest and 1 being the lowest grade.

In July 2015 the Government announced a review of the post 16 education sector. The Government has set a very short timeframe for these reviews, with the last of the six waves finishing in March 2017. Stoke-on-Trent and Staffordshire FE provision is included in the second wave. The review will look to move towards fewer, larger, more resilient and efficient providers. It is anticipated that this will enable greater specialisation, create genuine centres of expertise able to support progression up to a high level in professional and technical disciplines<sup>6</sup>. The Government has proposed the formation of Institutes of Technology. They will focus on high level STEM provision at levels 3, 4 and 5 providing the skills needed by employers in their areas. The Institutes of Technology will have their own independent identity and governance and will be nationally branded and focus on achieving a step-change in provision of higher level skills.

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<sup>4</sup> Biology -23%, Chemistry -13%, Physics -31% - Source TeachVac/UCAS/Guardian, 2015

<sup>5</sup> Department for Education and National College for Teaching and Leadership, Initial Teacher Training Census for the Academic year 2015/16, England, Nov 2015

<sup>6</sup> Department for Business, Innovation and Skills, Reviewing post-16 Education and Training Institutions, 2015

## Local

Currently the working age population (16-64 years) in Staffordshire having no qualification is 11.7%, which is above the national average of 9.7% but below the West Midlands Regional figure of 13.6%. Tamworth and Stoke-on-Trent have the highest proportion of working age population with no qualifications at 20.7% and 19.4% respectively. The proportion of Staffordshire's working age population qualified to NVQ Level 2+ is similar to the national average, whereas in Stoke-on-Trent it is significantly below the national average.

Stoke-on-Trent and Staffordshire fall well behind the national average for both NVQ Level 3+ and 4+ qualifications. In Staffordshire half (49.5%) of the working age population are qualified to NVQ Level 3+ equivalent and above, whereas Stoke-on-Trent it is 40.2%, both well below the national average of 55.1%. The situation is similar for NVQ Level 4+ with just over a quarter (27.1%) of the working age population in Staffordshire qualified to degree level or above and less than a fifth (18.9%) in Stoke-on-Trent, again both well below the national average of 33.4%.<sup>7</sup>

The Government recently announced that HS2 line between Crewe and Birmingham will be delivered 6 years earlier than previously announced. HS2 could be running through Staffordshire by 2026. This will provide a great opportunity for those with STEM skills not only during the construction phase but also after as a result of the anticipated economic growth as businesses seek to reap the benefits of HS2. It is anticipated that tens of thousands of jobs will be created during the construction phase, including over 2,000 apprenticeships.

October 2015 saw the launch of a landmark partnership to deliver the Northern Gateway Development Zone. The Northern Gateway Partnership is a ground-breaking collaboration of seven local authorities and the Cheshire and Warrington and Stoke-on-Trent and Staffordshire Local Enterprise Partnerships which aims to capitalise on the investment potential arising from HS2 infrastructure through the area. It aims to unlock major new growth and investment opportunities which could deliver more than 100,000 new homes and 120,000 new jobs by 2040 by creating a new Growth Zone as the connecting gateway to the Northern Powerhouse and the Midlands Engine.

In 2011, the UK Employer Skills Survey found that 4% of Staffordshire businesses had at least one hard-to-fill vacancy, representing just over 1,500 vacancies across Staffordshire. In total 23% of the hard-to-fill vacancies were in skilled trades occupations<sup>8</sup>.

Nearly a fifth (17%) of businesses report that at least one of their employees is not fully proficient. Over 22,000 workers or 7% of the total workforce in Staffordshire were reported to have a skills gap. Skills gaps in Stoke-on-Trent and Staffordshire are most commonly caused by transient factors, such as staff training only being partially completed (55%), they are new to the role (46%), the development of new products and services (45%) and the introduction of new technology (42%).

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<sup>7</sup> Stoke-on-Trent and Staffordshire Enterprise Partnership, 2014 – The Stoke-on-Trent and Staffordshire Skills Plan Evidence Base – March 2014

<sup>8</sup> Stoke-on-Trent and Staffordshire Enterprise Partnership, 2014 – The Stoke-on-Trent and Staffordshire Skills Plan Evidence Base – March 2014



## 5. Outcomes and Priorities

The importance of STEM subjects to the national and local economy is well known and understood. There is significant research that sets out the challenge of securing sufficient quality and quantity of the STEM and employability skills that businesses need to grow. Individuals will benefit from investing in and honing STEM skills as the keys to accessing high value jobs where there are well-documented shortages and growing demand<sup>9</sup>.

The Stoke on Trent and Staffordshire LEP has set out in the Strategic Economic Plan the key sectors that will drive economic growth, new jobs and wealth creation in our localities. The LEP has identified STEM as one of the sectors with the greatest potential for growth<sup>10</sup>. Access to and engagement with STEM by education stakeholders, businesses and other key partners can lead to a shared programme of work and activity that gives visibility and status to the STEM activity across the LEP area.

Locally, many employers and businesses contribute actively to this agenda through their work in education, in apprenticeships, workforce development and their business innovation approaches and networks. The outcomes for the Education Trust STEM Strategy Group are:

- A strengthened engagement with the wider education sector including school settings, colleges, universities and training providers will support the extended ownership of STEM priorities and secure the collective endeavour and priority placed on STEM subjects both through the curriculum and through the extended learning environment.
- Utilising the key networks of the LEP and Education Trust and exploiting the connectivity of all partners will strengthen the communications approach to STEM.
- Improved connectivity and positioning of STEM within each partner's business planning and approach with increased utilisation of system wide resources and influence will help to create the environment for change through Careers and Participation Services; Post 16 Study programmes; Research and Development investments; workforce development strategies, curriculum design and delivery; corporate and the conduct of social responsibility.

To achieve these outcomes and the strategy's vision the STEM Strategy Group will focus on five priorities; Employees; School; Apprenticeships; Further Education; and Higher Education. These following pages set out why these priority areas are important along with the key areas for action and an idea of what success will look like for each priority. The table overleaf provides an idea of what success will look like for each of the five priority areas.

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<sup>9</sup> Houses of Parliament - The Parliamentary Office of Science and Technology, STEM education for 14-19 year olds – Post note 430 (2013)

<sup>10</sup> Stoke-on-Trent and Staffordshire Local Enterprise Partnership, Strategic Economic Plan Part 1 – Strategy, 2014

## What Will Success Look Like?

STEM Priorities	What will success look like?
<b>1. Employers</b>	<ul style="list-style-type: none"><li>• Employers are influencing the STEM curriculum of education and training providers</li><li>• Employers have full awareness of STEM related learning and training opportunities available to them through education and training providers</li></ul>
<b>2. Schools</b>	<ul style="list-style-type: none"><li>• Schools have sufficient availability of specialist teachers in STEM subjects to fill outstanding vacancies</li><li>• STEM is fully integrated in careers, education information, advice and guidance in schools</li><li>• An increase in the number of students that choose to study STEM subjects</li></ul>
<b>3. Apprenticeships</b>	<ul style="list-style-type: none"><li>• An increase in the number of STEM apprentices in Stoke-on-Trent and Staffordshire.<ul style="list-style-type: none"><li>- An incremental increase in the volume of STEM Apprenticeship starts over the next 5 years, from 2,370 starts in 2014/15 to 3,500 starts in 2019/20.</li><li>- An incremental increase in the proportion of SSLEP STEM Apprenticeship starts over the next 5 years, from 18.4% of all starts in 2014/15 to 22.0% of all starts in 2019/20.</li></ul></li><li>• An increased in the recognition of the value of apprenticeships in the STEM sector.</li></ul>
<b>4. Further Education</b>	<ul style="list-style-type: none"><li>• Further Education providers deliver a coherent suite of STEM technical, vocational and academic pathways for employers and other education providers</li><li>• Further Education providers have world class STEM facilities and equipment</li></ul>
<b>5. Higher Education</b>	<ul style="list-style-type: none"><li>• An increase in the number of STEM degree starters in STEM subjects</li><li>• Higher Education providers deliver a coherent suite of STEM technical, vocational and academic Higher Education pathways.</li></ul>

## **Employers**

The STEM sector is vital to the success of UK PLC. It can only succeed if the current and future workers have the right mix of skills to meet the demands of STEM employers. Therefore, it is in employers' interest to ensure that we have the right training, education and skills policies to develop the future workforce.

Employers should contribute to the debate on STEM skills and training through the LEP network and help develop the strategy and policies that will shape the approach to STEM education and training in Staffordshire and Stoke-on-Trent. A collaborative approach will ensure that employers are able to articulate their future requirements for the workforce and influence the approach to developing that workforce.

Having a ready-made skilled workforce on the doorstep will help employers be more responsive to the changing demands in the market and ensure they are able to fill vacancies quickly without having to go through the process and expense of training new employees. However, employers should also be open to the idea of training and developing their existing employees by working in partnership with training and education providers. Having highly skilled workers will help businesses to be more competitive, grasp opportunities and drive through innovation.

## **Local Provision and Future Priorities**

There are a number of global STEM based businesses located in Stoke-on-Trent and Staffordshire. Companies such as Jaguar Land Rover, KMF, Perkins and JCB are already engaged in supporting STEM education and training for their current workforce and for potential future employees.

Information, Advice and Guidance (IAG) is critical in engaging with employers and making them aware of training and skills development opportunities and networking, in order to build a workforce that meets future STEM demands and help them to grow and develop their businesses.

The priorities of the STEM Strategy Group are to:

- Engage with employers so that they are able to articulate the skills and courses required to meet their business needs and to shape and influence the development of STEM learning & training opportunities.
- Promote greater awareness of STEM learning & training opportunities to employers.
- Work to promote and support effective communication exchange between employer reps on the STEM strategy group and their respective industry networks.
- Support the growth and skills hub so that it can continue to expand its specialist advice offer in digital skills, energy efficiency and modernisation of supply chain to the STEM employer sector.

## Schools

There continues to be a deficit in the number of specialist Physics and Maths teachers in schools (nationally), and too many schools lack the capacity to offer students the Physics and Maths courses they need. There has been a significant shortfall in the number of new recruits for Design and Technology and Computer Science teachers entering an Initial teacher Training Programme in 2015/16<sup>11</sup>. A recent report<sup>12</sup> by the National Audit Office indicated that almost a third of secondary physics classes in England were being taught by teachers with no more than an A-level in the subject and this deficit nudges up to 40% for computer science classes. This leaves too many young people without the option of studying these subjects past GCSE level and has denied many young people the opportunity to progress along STEM career pathways.

There is national and local interest in the inequality of careers guidance young people receive in schools and colleges. The CBI's Education and Skills Survey 2015 found that nearly four out of five businesses (77%) across the UK felt that the quality of careers advice young people receive is not good enough to help them make informed decisions about future career options<sup>13</sup>.

It is unclear also to what degree subject teachers in schools and colleges make explicit and positive links between STEM subjects and worthwhile careers. However 'Nothing in Common', a report commissioned by the Education and Employers Taskforce found a mismatch between the career aspirations of young people and projected job growth up to 2020. There was more demand for professional careers in science, research, engineering and technology than projected labour market demand. In general terms however STEM does not have a strong profile in the 10 most popular career choices among young people. Most schools and colleges in the LEP area buy in external IAG from organisations with the Matrix standard as part of their overall IAG offer to learners with a minority appointing their own in-house advisers. Stoke on Trent City Council and Entrust are major suppliers of external IAG to schools and colleges in the LEP area. Schools vary in terms of the extent and quality of the provision of a careers curriculum either as a discrete subject or as part of a broader Personal, Social, Health and Economic (PSHE) programme.

## Local Provision and Future Priorities

There are many examples of schools in Stoke-on-Trent and Staffordshire having innovative approaches, working with employers, charities and training providers to deliver STEM education within schools.

The Education Trust Locality Project is operating pilot schemes in the four priority areas of Tamworth, Cannock, Newcastle-under-Lyme and Stoke-on-Trent. These pilots are seeking to align the needs of local business with emerging skills provision and to change culture and practice in schools and academies. There are approximately 45 business partners already

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<sup>11</sup> Department for Education and National College for Teaching and Leadership, Initial Teacher Training Census for the Academic year 2015/16, England, November 2015

<sup>12</sup> National Audit Office, Training New Teachers, February 2016

<sup>13</sup> CBI/Pearson, Inspiring Growth – Education And Skills Survey 2015, 2015

secured to work with 21 secondary schools and academies to provide advice, support and services.

Stoke-on-Trent City Council has launched an innovative hub to train and retain specialist maths teachers with matched funding from Bet 365.

Entrust has recruited 740 volunteers from local businesses to support STEM Education in schools. There are a wide variety of services, events and activities available for schools to use to engage young people in STEM based activities.

Companies based in Staffordshire such as Jaguar Land Rover, KMF, Perkins and JCB are already actively encouraging young people to consider STEM career pathways with support for schools in the region. Using KMF, Perkins and JCB as exemplars we now need to grow the number of companies meaningfully engaging with schools and colleges in structured STEM activity.

Jaguar Land Rover is working in partnership with Staffordshire County Council, Wolverhampton City Council and South Staffordshire Council to operate an Education Business Partnership Centre at its Engine Manufacturing Centre on the i54 development site. This Centre promotes careers in civil engineering and advanced manufacturing and it is delivering interactive learning programmes to schools, colleges and universities. These sessions are delivered in a real business environment and will be suitable for all ages, abilities and qualification levels. A programme of activities is promoted to education institutions and they will have the opportunity to book onto workshop programmes and get involved with a range of activities from engineering to business and career challenges.

While recognising there is a considerable amount of effort, skills and expertise in promoting STEM education in schools in Stoke-on-Trent and Staffordshire, it is not universal. There are gaps in provision which need to be addressed so that all schools are able to benefit from these opportunities. There are also opportunities to enhance existing provision.

The priorities for the STEM Strategy Group are to:

- Promote greater links between schools and industry through the Education Trust Locality Project.
- Provide case studies of models that demonstrate good partnership between schools and employers, and promote these models as a way forward.
- Make schools aware of the STEM strategy and the work of the STEM Strategy Group
- Promote the need for more specialist science, maths, design and technology and computer science teachers to fill existing and future vacancies in schools in Stoke-on-Trent and Staffordshire.
- Work with schools to ensure that every young person that wants to has the opportunity to study a vocational qualification.
- Work to ensure that STEM is fully integrated in careers advice provided in schools and that STEM is incorporated in all Information Advice and Guidance (IAG) provided to young people.

- Develop an industry-backed manufacturing engagement in schools pilot programme to drive up the number of young people choosing manufacturing as a sector.

## **Apprenticeships**

Employers across the STEM sector value apprentices and what they are able to bring to the business. Supporting the development of apprentices with on the job skills and experiences alongside nationally recognised qualifications creates a bond and loyalty from which businesses benefit.

Despite considerable success with apprenticeships across Stoke-on-Trent and Staffordshire in recent years and ambitions to create 80,000 apprenticeship starts in the next five years across all employment sectors, there remain 1,400 apprenticeship vacancies in the area. This number of vacancies could be attributable to low GCSE attainment, poor employability skills, lack of awareness of apprenticeships as a career path, over and competing learning provision in 6<sup>th</sup> forms and colleges or the unpopularity and image of some sectors among young people and their parents.

The apprenticeship programme has been embraced by employers in Stoke-on-Trent and Staffordshire, with the STEM sector creating considerable numbers of apprenticeship opportunities for young people. In 2014/15, there were 12,870 new apprenticeships across all sectors in the Stoke-on-Trent and Staffordshire LEP area. Of this total, 2,370 apprenticeships were in the STEM sector. This equated to 18.4% of all apprenticeships in the area. The vast majority<sup>14</sup> of the STEM apprenticeships were in Engineering and Manufacturing technologies. These apprenticeships are fairly evenly distributed across the LEP area, with the highest number (540) being in Stoke-on-Trent. The number of apprenticeships in Information and Communication Technology across the LEP area continues to grow in significance with a total of 300 apprenticeships in 2014/15.

The increasing profile of higher and degree apprenticeships offers an additional opportunity in the region for young people to choose apprenticeships as an alternative to university. Higher and degree apprenticeships offer businesses in the region the chance to recruit new staff and develop their existing workforce.

Recently developed apprenticeships in the STEM area include Digital and Technology Solutions, Infrastructure Technician, Data Analyst, Software developer, Engineering Design, Laboratory Technician, Laboratory Scientist and, Science Manufacturing Technician, provide a broad range of solution for organisations recruiting and developing apprentices.

## **Local Provision and Future Priorities**

Many local employers have been employing and training apprentices working alongside local colleges and other training providers.

The LEP Apprenticeship Group has published a Stoke-on-Trent & Staffordshire LEP Apprenticeship Strategy that provides clear focus on the priorities for apprenticeship growth and how these priorities can be addressed by working collaboratively with all partners. The LEP Apprenticeship group has led on the following initiatives to date:

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<sup>14</sup> 2,060 new apprenticeships in Engineering and Manufacturing Technologies, which equates to 87% of all STEM apprenticeships in the Stoke and Staffordshire LEP area in 2014/15

- Staffordshire Apprenticeship Ladder – to ensure that more businesses are aware of the benefits of apprenticeships and more young people are apprenticeship ready
- Apprentice Business Ambassadors – a network that uses businesses to promote apprenticeships to business
- Apprenticeship Business Help Line – as part of the Growth Hub
- Annual Apprenticeship Awards – that recognises the contribution and achievement of apprentices to business
- Apprenticeships Graduation Ceremony - that recognises the highest level of achievement of apprenticeships and puts them on par with higher education

Staffordshire University has been validating Higher Apprenticeship Awards for 7 years and has a growing national reputation with the Department for Business Innovation & Skills and sector organisations with contributions to UK research on the growth of degree apprenticeships.

The University responded to the Skills Funding Agency call (Round 1) for Higher Education Institutions lead providers of apprenticeships and is currently the highest provider of frameworks in England.

The University is working with a number of local employers and trailblazer groups to develop both higher and degree apprenticeship standards and qualifications in STEM including advance manufacturing and engineering.

To ensure that apprenticeships in advanced manufacturing and engineering become even more attractive to young people and valued by employers.

The priorities of the STEM Strategy Group are to:

- Work to promote apprenticeships effectively.
- Work with partners and employers to increase the number of STEM apprentices in Stoke-on-Trent and Staffordshire
- Support Entrust to promote STEM in schools
- Work to ensure that STEM apprenticeships are promoted with employers through the National Apprenticeship Service, STEMNET, Entrust and local partnership i.e. Staffordshire Providers Association (SPA), Chamber of Commerce, NAS et.al.
- Recognise and promote the importance of apprenticeships leading to higher level qualifications.
- Work to promote the real value of Traineeships
- Work to maximise apprenticeship opportunities during and after the construction of HS2.



## **Further Education**

The Further Education (FE) sector has a vital role in developing the workforce for local employers, ensuring the supply of new skilled work ready employees. It also plays an important role in providing opportunities for the workforce to update and refresh their skills to meet the ever changing demands of business.

The jobs of tomorrow have possibly not even been thought up yet so it's vital, if high-value sectors such as advanced manufacturing and engineering are not to fall behind international competition, that workers are able to retrain and acquire new skills.

While the focus on apprenticeships has been a real positive over the last five years, we can't afford to neglect FE as a consequence of that focus. Innovation and adaptability is the key to success. The FE sector is having to accommodate a series of deep funding cuts including a 24% cut to the adult skills budget for 2015/16.

## **Local Provision and Future Priorities**

Skills Staffordshire is a partnership of seven further education colleges, a variety of local private training providers and the Chamber of Commerce, who operate across the Stoke and Staffordshire Local Enterprise Partnership area. Formed to provide a single point of access to high quality training and support for Staffordshire businesses and individuals, the partnership aims to play a key role in the economic development of the area and contribute to business growth and the ambitions of the Stoke and Staffordshire LEP. The partners are committed to working together to promote training and development, to making it easier for employers to navigate the skills system and to offering flexible training that meets the needs of individuals, businesses and other stakeholders.

FE colleges and Training Providers offer a range of comprehensive Part Time and Full Time STEM related courses from levels 1 – 5.

The Education Trust recognises the value of further education in providing opportunities for learning not just to young people entering the workplace, but to older workers as well.

The priorities of the STEM Strategy Group are to:

- Continue to develop and support the strategic priorities of skills in Stoke-on-Trent and Staffordshire as detailed in the emerging Skills Strategy.
- Promote a well developed curriculum to education and training providers, relevant to STEM, which delivers transferable skills, knowledge and progression pathways.
- Promote a coherent suite of technical vocational and academic pathways to education and training providers.
- Promote the availability of world class facilities and contents for learning within FE Infrastructure

## Higher Education

The UK's Higher Education is widely recognised as world-class; UK universities regularly feature in lists of the world's best. Foreign students, attracted by their reputation, flock to them in increasing numbers. It is a sector which has a huge role to play in ensuring the UK is able to keep pace in the 'global race'.

Higher education is particularly important to STEM industries. The undergraduates of today are the researchers, innovators and problem solvers of tomorrow. It is therefore vital that we encourage more of our best and brightest young minds to study STEM subjects if we are to face up to the big challenges from climate change to resource scarcity.

Higher education cannot exist in a self-contained bubble, particularly when it comes to STEM disciplines. Engineering, for example, cannot exist within textbooks alone - students need to be equipped with the ability to apply the knowledge they gain through their studies, and need to be able to adapt their skills to creatively solve new challenges they might face in their careers.

Within Stoke-on-Trent and Staffordshire our Universities offer world class opportunities in STEM subjects. Both Keele and Staffordshire Universities have strong research and development links with businesses, with Keele Science Park home to a number international leaders in medical technologies.

Staffordshire University has invested £40m+ in the campus in Stoke on Trent, £28m of which has been spent on bringing together the STEM subjects onto one campus. Together the Science Centre, Digital Kiln and Engineering Facilities delivers an effective, credible and well received outreach programme to schools, colleges, businesses and community organisations reaching over 5000 people and 60+ schools and colleges since 2012.

Both the Universities of Wolverhampton and Derby have an increasing influence on Higher Education in the area, with Derby University having close relationships with Buxton and Leek College and Wolverhampton University looking to build a new University Technical College (UTC) in Stafford focused around advanced manufacturing, business and finance.

## Local Provision and Future Priorities

Staffordshire University works closely with partner colleges to enhance the delivery of higher level knowledge and skills with partner colleges delivering higher level programmes including HNC, HND and Foundation degrees accredited through the University. For example: The Skills and Technology Centre and the Sports Science Lab at Newcastle-under-Lyme College offer extensive curriculum including Level 3; Higher Apprenticeships, Foundation Degrees, HNC and HND courses.

The priorities of the STEM Strategy Group are to:

- Work to promote the expanded provision, and take-up of STEM degrees with vocational aspects.
- Work to ensure more STEM graduates go into in STEM careers locally.
- Promote the widening of outreach programmes for STEM disciplines.

- Encourage HE providers and businesses to work together to ensure that we have more higher level and technical skills for our advanced industries and occupations.

## 6. Governance and Partnership Structure

The STEM Strategy Group<sup>15</sup> is the vehicle for:

- **STEM partnership** – sponsoring the collaborative network and environment for joint working.
- **STEM priorities**- the identification of what we need to work on and to make a difference to.
- **STEM planning** – establishing how our priorities can be delivered, who by and with what resources, and horizon scanning for new opportunities and innovation
- **STEM progress** – monitoring, evaluating and tracking change to support collective accountability

The Stoke on Trent and Staffordshire Local Enterprise Partnership forms the key local strategic partnership and therefore heads the governance pyramid and partnership structure.

The STEM Strategy Group will provide performance reports and receive challenge from the Stoke-on-Trent and Staffordshire Programme Group which in turn reports into the Stoke-on-Trent and Staffordshire Education Trust.

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<sup>15</sup> The STEM Strategy Group facilitated by Entrust

## STEM Action Plan

### Employers - Key areas for Action

- E1. To increase employer representation on the STEM strategy group with focus towards employers in ceramics and business professional sectors. Three new employers by September 2016. Action STEM Strategy Group members.
- E2. To complete and share with industry networks, two case studies each year of positive engagement between employers and education institutions. Action STEM Strategy Group employer reps. One case study to be completed by September 2016.
- E3. To consult with industry networks on the draft STEM strategy by September 2016 Action STEM Strategy Group employer reps.
- E4. To develop a STEM dimension within the emerging LEP IAG and Employability Framework for Staffordshire and Stoke on Trent Action: Stoke CC & Staffs CC reps by September 2016.
- E5. To ensure there is a spotlight on STEM in the commissioning specifications produced by the LEP for European Structural and Investment Funds (ESIF) tendering. Action: Action Stoke CC & Staffs CC reps by September 2016.

### Schools - Key areas for Action

- S1. To complete and publish three case studies per calendar year demonstrating good partnership arrangements between Entrust STEM team, employers and schools. Action: Entrust STEM team.
- S2. To invite a secondary school rep and a primary school rep on the STEM Strategy Group. Action Entrust/Council/City by September 2016.
- S3. To prepare a strategy to determine what part schools can play in promoting teaching in STEM subjects. Action School reps by March 2017.
- S4. To develop and implement a strategy to promote STEM programme pathways and careers in STEM sector to young people in schools. Action Entrust and Stoke-on-Trent City Council January 2017 (build into LEP IAG/Employability framework)
- S5. To contribute to the Stoke-on-Trent Association of Secondary College and Academy Leaders (SASCAL) strategy to ensure STEM has a high profile in the forward planning of SASCAL. Action Stoke CC rep.
- S6. Develop a Regional STEM Teaching and Learning Conference to promote the sharing of effective practice between teachers. Action School reps. Conference to be delivered in Summer term 2017.
- S7. Develop sub-regional STEM communities where local groups of teachers can meet to promote and develop STEM Teaching and Learning. Action School rep by November 2017

- S8. Promote Teacher/STEM employee exchange day whereby teachers shadow a STEM employee for a day and vice versa, enabling teachers to make links with industry and improve their subject knowledge. The conference in the summer term would have a session whereby teacher can meet employers and then the teachers can organise potential teacher/STEM employee exchange in Autumn term 2017. Action School rep. Autumn term 2017
- S9. Develop a strategy to promote and celebrate the STEM entrepreneurial ideas of pupils/students with the introduction of a STEM competition for schools. Action School, rep by December 2016.

### **Apprenticeships - Key areas for Action**

- A1. Entrust Skills and Employability team to promote STEM progression pathways in schools utilising case studies generated from the STEM strategy group – Action Entrust by January 2017.
- A2. To develop 5 new STEM Traineeship programmes tailored to employer needs by September 2018. Action Skills Staffordshire/Staffordshire Providers Association
- A3. To develop 5 new STEM higher Apprenticeship pathways aligned to employer needs by September 2018. Action Skills Staffordshire/Staffordshire Providers Association
- A4. To develop 2 new STEM Degree Apprenticeships by September 2018. Action Staffordshire University.

### **Further Education - Key areas for Action**

- F1. To review the STEM curriculum offer and develop new STEM programmes appropriate to meet employer need and accredited by industry professional bodies where appropriate. Action each college and provider in the Skills Staffordshire partnership to provide one case study by September 2018.
- F2. To review IAG practices and marketing material to further promote the STEM progression pathway to students. Action each college and provider in Skills Staffordshire partnership to provide one case study by September 2018.

### **Higher Education - Key areas for Action**

- H1. To invite a HE representative to the STEM strategy group. Action Entrust STEM team by Sept 2016
- H2. To review the STEM curriculum offer and develop new STEM programmes appropriate to meet employer need. Action HE institutions to provide 1 case study by Sept 2018.
- H.3 Staffordshire University will deliver a number of initiatives to promote the STEM agenda in schools, colleges and the broader community encouraging progression into and through University to post graduate levels:

- Schools and Colleges
  - 1 event to promote women into engineering by July 2017
  - Sponsor 2 schools for Young Engineer of the Year in 2016/17
  - 1 event during British Science week 2017
  - 2 STEM enrichment lectures in 2017
  - Series of Port Vale Football Club STEM workshops during 2017
- Families and Broader Community
  - 1 community event focussing on STEM
  - 1 public lecture as part of the wider University public lecture series focussed on STEM
- Curriculum Links
  - Mentoring in 2 – 3 schools using STEM Ambassadors during 2017
  - 1 computer science in schools conference by end of July 2017
- Post graduate opportunities
  - 2 D/L or blended learning conversion courses in engineering and computing offering the opportunity for those with non-STEM qualifications to move into STEM roles.
- Business links
  - 2 Industry Advisory Panels in STEM subjects to advise the University on curriculum development and future proofing by September 2018

### Additional Strategy Context Evidence

#### Employers

Many local employers are engaged in supporting STEM education and training. One of the prime examples is the JCB Academy in Rocester, catering for GCSE and A level students as well as apprentices; the academy has a clear focus on business and engineering. It is run along business hours with the curriculum and learning techniques allowing students to combine theory with practical activities.

Recent investment in an engine manufacturing plant by Jaguar Land Rover at I54 in South Staffordshire has created new opportunities for apprenticeships as well as new employment for skilled engineers.

#### Schools

In Stoke on Trent the percentage of children at Key Stage 1 who are at Level 2+ and Level 3+ in science is slightly below the national average, similarly in maths, although the gaps are closing. At Key Stage 2 in science at L4+ and L5+ the city is below the national averages but closing the gap. In maths the city is slightly ahead of the national average at L4+ but behind at L5+. In 2015 Staffordshire had an increase of 0.4 percentage points in the number of GCSE students achieving 5+ A\*-C grades including Maths and English compared with the previous year, this equates to 55.3% of pupils. Overall Staffordshire is now 2.5 percentage points above the national average. Stoke-on-Trent has experienced a decline of 1.8 percentage points between 2014 and 2015, with 48.2% of pupils achieving 5+ A\*-C grades including Math and English in 2015 and is now 4.6 percentage points below the national figure. The city is behind the national average in core science and in maths but ahead in product design.

Staffordshire Average Points Score per A level entry in 2015 decreased to 210.3 compared to an increase nationally of 0.2, making the national average 214.8 points.

In Staffordshire there were 1,336 A level science entries in 2015, a marginal decline on 2014. The percentage of A\*-A grades in Chemistry and Physics declined in 2015 compared with the previous year while Biology increased. A\*-A grades in sciences in Staffordshire were significantly below the national averages. However, the percentage achieving A\*-E grades increased in all subjects in 2015 in Staffordshire and are comparable with the national average. In Stoke-on-Trent there were 355 A level science entries in 2015, an increase on 2014. Enrolments for Chemistry and Biology were double the enrolments for Physics in 2014 and 2015. The percentage of A\* -A grades in Chemistry and Biology fell in 2015 compared to 2014 while Physics improved. The percentage of A\*-A grades in Stoke on Trent are well below the national average. However, the percentage achieving A\*-E grades increased in all subjects in 2015 in Stoke on Trent and are either above or comparable with the national average.

There were just under 400 A level technology<sup>16</sup> entries in 2015 in Staffordshire, with a decline in entries in ICT and Design and Technology and an increase in Computing compared with the previous years. The percentage of A\*-A grades in Computing (20%) and ICT (11.3%) were

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<sup>16</sup> Design and Technology; Computing; and ICT



significantly above the national averages of 16.3% and 9.2% respectively. In contrast, A\*-A grades in Design and Technology (8.6%) in Staffordshire were well below the national average of 16.4%. In Stoke-on-Trent there was a slight increase in enrolments in Design and Technology in 2015 and also in Computing. Overall, enrolments were low in these subjects in 2014 and 2015 compared to sciences and maths. A\*-A grades in Design and Technology fell but are still above the national average and there is a 100% success record in this subject for A\*-E grades. A\*-E grades in Computing rose slightly in 2015.

In 2015 there was an 8.8% drop in the number of A level mathematics enrolments in Staffordshire (725) compared with the previous year. Overall, 33.9% of students in Staffordshire sitting A level mathematics received A\*-A grades and 43.7% of further mathematics entries. These are significantly lower than national averages where 42.6% of entries in mathematics and 57.2% of further mathematics received a grading of A\*-A.

In Stoke-on-Trent maths and further maths enrolments rose in 2015. Maths has the highest enrolments for all the STEM subjects in Stoke on Trent at 170 in 2015. A\* to A grades in maths fell and are also well under the national average. A\* to E grades fell in maths and further maths but are comparable with national averages.

Entrust has also worked with JCB to developed a ten week project with the support of BE Together educational charity. The project is based on teaching materials sponsored by JCB and targeted at Year 10 students working in after school STEM clubs. There are already 20 successful STEM clubs running in secondary schools.

The BE Together educational charity sponsor a number of projects which promote STEM and work related learning in schools in Stoke-on-Trent and Staffordshire including:

- Budding Brindleys - a 3 day programme on a construction theme to compliment A levels (16-18 year olds)
- STEM Centre: Introduction to STEM subjects (Key Stage 3)
- STEM Centre / JCB : Robotics Project (Year 10)
- Newcastle-under-Lyme College: Developing a STEM curriculum for outdoor centre activity (Key Stage 2,3 & 4, plus post 16 education)

Greenpower provides secondary schools with the opportunity to engage in the construction of electrically powered racing cars. Greenpower also provide an opportunity to primary schools to construct an electrically powered kit car. Both projects provide students with the opportunity to attend national competition events.

The Royal Academy of Engineering is providing sponsorship to six secondary schools and 10 primary schools in Stoke-on-Trent to enrich their STEM work related learning.

The Engineering Education Scheme is a business funded project and is based around solving an industrial problem and is open to Year 12 pupils where they design, build and present their solution to a regional business panel. The Go4Set EDT project is another business funded project and is based around solving an industrial problem and is open to Year 9 pupils. Working in teams, students design, build and present their solution to a regional business panel.

### Key Structural & Policy Developments

**Stoke-on-Trent and Staffordshire Local Enterprise Partnership (LEP)** established the Education Trust as a means of ensuring that Stoke-on-Trent and Staffordshire gets ahead and stays ahead when it comes to education, training, skills and jobs. The Education trust brings together all organisations which have a commitment to raising education and training achievement, employability and aspirations among young people and adults. The purpose of the Stoke-on-Trent and Staffordshire Education Trust is:

*“To shape a high performing, relevant and responsive education and skills system that meets today’s business needs, and anticipates the challenges and opportunities of tomorrow.”*

This is about:

- Schools and employers working together to raise aspirations and make sure young people are equipped to work in business and achieve their ambitions
- Further Education providers and employers working together so that people can access jobs and training and upskill and reskill the workforce
- Higher Education providers and employers working together to ensure we have more higher level and technical skills for our advanced industries and occupations

The vision for the LEP is to develop a modern and flexible skills offer which enables all people to up-skill and re-skill, so we can match the growing needs of Stoke-on-Trent and Staffordshire’s priority economic sectors, ensuring local people benefit from these jobs.

The outcomes for the Stoke-on-Trent and Staffordshire’s Education Trust are:

- An absolute increase in the number of people in employment, particularly in the priority growth sectors.
- Growth in productivity as people and businesses have the right skills and opportunities to use them in work.

The ambition and priorities for the Education Trust over the next five years are to:

- Support the creation of 50,000 jobs
- Create 80,000 apprenticeship start
- Raising aspirations and focus on local opportunities for growth and prosperity in key local growth sectors

The Education Trust’s key areas of activity will be focused on three priority areas:

- Apprenticeships
- Careers Guidance and employability
- Effective world class skills system

Through the City Deal and Growth Deal funding has been secured alongside private sector investment to develop the **Advanced Manufacturing and Engineering (AME) Hub over 2 phases between 2014 and 2017**. The first phase offers specialist provision in automotive and

hybrid technologies delivered by Martec Training; renewable pneumatics and hydraulics delivered by Stoke-on-Trent College; and robotics, CNC milling, 3D printing and mechanical engineering delivered in Tamworth by South Staffordshire College. Phase 2 is in development and will be completed in 2016- 2017 and will focus on sites in Penkridge, Stafford and Rocester. Its purpose is to increase skills in the sector to provide employers with a suitable workforce to achieve economic growth. The AME hub will provide world class vocational environments, with state of the art facilities in local communities linked to key employers, providers, schools and colleges. The spokes will work in partnership to achieve:

- Growth in sector specific traineeships and apprenticeships
- Upskill the current workforce in the sector to improve productivity
- Upskill and retrain the unemployed and young people identified as Not in Education, Employment or Training (NEETS) to help them gain employment in the sector
- Provide specialist facilities and training to meet employer needs
- Promote careers and career pathways in the sector and use the facilities and training as a progression route

In December 2014 the Government announced the creation of a **National Careers and Enterprise Company** to help young people consider all the options available to them when they leave school and ensure they leave school fully prepared. The Careers and Enterprise Company is currently undertaking work in five key areas; the Enterprise Adviser Network; Careers and Enterprise Fund; Enterprise Passport; publications; and mentoring. Since September 2015, the Careers and Enterprise Company have been working with 27 LEP Partnerships to roll out the Enterprise Adviser Network programme. The Stoke-on-Trent and Staffordshire LEP has been developing its own comparable model 'The Education Trust Locality Project'.

**The Department for Work and Pensions** is rolling out its Jobcentre Plus programme in schools. Local Jobcentre Plus advisors will offer 12 to 18 year old pupils advice on options like traineeships and apprenticeships. As well as offering advice on the labour market, the advisors will help schools to offer work experience opportunities. Each school will decide what level of support advisors' offer to their pupils. Jobcentre Plus staff will work with the Careers & Enterprise Company to ensure schools receive a coherent and aligned offer.

**The Staffordshire Providers Association (SPA)** is a collaborative group of private training providers in Staffordshire. SPA members work with local employers to offer a wide range of apprenticeship provision across Stoke-on-Trent & Staffordshire. SPA members play a significant role in supporting the Apprenticeship growth agenda for the area and in achieving the aim to make apprenticeships the skills option of choice for employers and people and especially young people.

As part of a **national review of Further Education and Sixth Form provision**, Stoke-on-Trent and Staffordshire commenced its review in January 2016. The process is expected to look to move towards fewer, larger, more resilient and efficient providers that can offer high quality skills provision which benefits learners, local employers and boost the economy. The review is led by a local steering group, with an independent chairman with a view to delivering:

- Institutions which deliver maximum value for public investment.
- An offer that meets each area's educational and economic needs.

- Providers with strong outcomes and greater specialisations.
- Sufficient access to high quality and relevant education and training for all.
- Provision which reflects changes in government funding priorities and future demand.<sup>17</sup>

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<sup>17</sup> Local Government Information Unit, Policy Briefing - Post 16 Education and Training Institutions: BIS Guidance on Area Reviews, 2015