

A close-up photograph of a person wearing white gloves, holding a test tube and a beaker. The person is holding the test tube in their right hand, tilted upwards, and the beaker in their left hand, tilted downwards. The background is a solid blue color. The text "Supporting Technical Skills in the Chemical Industry" is overlaid on the left side of the image.

Supporting Technical Skills in the Chemical Industry

November
2013

About this Report

This report, and the accompanying recommendations, represents the outcomes of a seminar that brought together over 50 chemical industry employers, trainers and stakeholders in June 2013 to discuss technical skills needs. This work is a collaboration between the Royal Society of Chemistry, Salters' Institute, Gatsby Charitable Foundation and Society of Chemical Industry.



Royal Society of Chemistry

The Royal Society of Chemistry is the world's leading chemistry community, advancing excellence in the chemical sciences. With over 48,000 members and a knowledge business that spans the globe, we are the UK's professional body for chemical scientists; a not-for-profit organisation with 170 years of history and an international vision of the future. We promote, support and celebrate chemistry. We work to shape the future of the chemical sciences – for the benefit of science and humanity.



Salters' Institute

The Salters' Institute, founded in 1918, is the flagship charity of the Salters' Company, ranked 9th in order of the Twelve Great City of London Livery Companies. The Institute aims to promote the appreciation of chemistry and related sciences amongst the young, and to encourage careers in the teaching of chemistry and in the UK chemical and allied industries. The Institute's three core activities are: Salters' Chemistry Camps; Salters' Festivals of Chemistry and Curriculum Development.



Gatsby Charitable Foundation

Gatsby is a foundation set up by David Sainsbury to realise his charitable objectives. Gatsby works in areas that David Sainsbury and the Trustees are particularly passionate about and where they believe charitable funding can make a real difference. Gatsby is currently active in six tightly-focused areas:

- Plant science research.
- Neuroscience research.
- Science and engineering education.
- Economic development in Africa.
- Public policy and research advice.
- The Arts.



Society of Chemical Industry

The Society of Chemical Industry (SCI) is a multidisciplinary membership organisation that connects scientists and business people in order to advance the application of chemical and related sciences for the benefit of society. We have 3,000 members drawn from academia and industry in over 70 countries. We share knowledge and create networks through our journals, C&I magazine and our conference programme as well as member interest groups and outreach activities including public lectures.

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Foreword

The need for high quality technical and vocational education has never been more important to the UK than it is today. The chemical industry has an ambition to raise its contribution to the economy by 50% – to £300 bn – by 2030, positioning itself as the country's leading manufacturing exporter. But that will only happen if the industry has the right people with the right skills to make the most out of the opportunities at hand.

Increasingly, employers report that shortages of people with technical skills are holding them back. Technical skills are more valuable than ever, as our industry becomes more high-tech and unskilled roles become rarer.

It was with this challenge in mind that over 50 employers, trainers and stakeholders came together at Salters Hall in London in June 2013, to consider how to support the technical skills needs of the chemical industry. The seminar was organised by the Royal Society of Chemistry, the Salters Institute, the Society of Chemical Industry and the Gatsby Charitable Foundation, reflecting the wide range of interest in this critical field. This report and recommendations draw on the discussions at this stimulating seminar.



The key to high-quality technical training is the close involvement of employers in the design and teaching of technical qualifications. There is a cultural barrier to overcome, too. Technical education does not enjoy the esteem it deserves, and students, parents, employers and even teachers are often poorly informed about the qualifications available – which is not surprising when there are so many of them. Training pathways need to be as clear and simple as possible, and more trainers and employers need to understand and recognise the Registered Science Technician benchmark.

The only way that these barriers can be overcome is through a systematic and concerted approach by employers, trainers, government, foundations and professional bodies, and this important report proposes how a start can be made.



John Holman

Sir John Holman FRSC is Emeritus Professor of Chemistry at the University of York and Chairman of the Salters' Institute Board.

Executive summary

The chemical science industries are critically dependent on the supply of people with the right level of technical skills. It is hoped that by 2030, the UK chemical industry will have increased its Gross Value Added (GVA) contribution to the UK economy by 50%, from £195 bn to £300 bn¹. In order to achieve this vision, the industry must ensure that it secures the right people with the right skills for a competent, diverse and sustainable workforce. Developing a coherent framework to deliver the technical skills requirements of the chemical industry will be vital.

The chemicals sector invests heavily in skills, and has a strong track record in recruiting graduates and apprentices. However, there are challenges to be overcome in order to ensure that the technical skills needs of the chemical industry can be met in a way that is sustainable while driving future growth. Six key challenges have been identified:

1. Establishing clear training and career pathways to technician roles.
2. Overcoming difficulties faced by employers in recruiting technicians.
3. Developing technicians within the work place.
4. Establishing and maintaining the quality of work based training and vocational courses.
5. Ensuring the sustainability of the technical training landscape.
6. Raising awareness of chemical science apprenticeships.

This report outlines recommendations to overcome these challenges, representing the outcomes of a workshop that brought together over fifty employers, training providers and chemical industry stakeholders. A systematic approach to the challenge will be required by employers, training providers, the Government, professional bodies, foundations and societies.

Recommendations

For employers

- Encourage applications from individuals holding Registered Science Technician (RSciTech) and Registered Scientist (RSci) designations when recruiting new employees.
- Invest in and develop the skills capacity within a company's geographical region by offering work placement opportunities to local colleges; collaborating with small and medium enterprises (SMEs) to share training resources and knowledge; and taking part in careers days and science fairs at schools and colleges.
- Fully budget for employee professional development and use the RSciTech and RSci registers as a development opportunity for employees not holding these qualifications while providing recognition for employees that do.
- Encourage experienced technicians to act as mentors, support teaching in colleges and represent vocational education on school and college governing bodies.
- Ensure more apprenticeships are made available to young people by taking advantage of grants and support mechanisms.
- Raise awareness of apprenticeships by exploring opportunities to promote individual success stories in the media, nominating apprentices for relevant awards and by encouraging recognised apprentices to act as ambassadors within the STEM Ambassador Network.

¹ *Strategy for Delivering Chemistry-
Fuelled Growth of the Economy.
UK Chemistry Growth Strategy
Group, July 2013*

For Government

- School and college performance tables should recognise vocational pathways and include employment destination measures.
- The quality of vocational pathways provided by schools and colleges should be measured by how well courses give students the skills and knowledge needed for employment or progression towards a specific occupation.
- Reduce the perceived complexity associated with apprenticeships and vocational qualifications by minimising the number of intermediary bodies involved.
- Ensure careers advisors within schools and colleges have up-to-date information and can confidently and competently promote vocational routes as a valid career choice.
- Ensure that every student is aware of the different, but equally valid, education pathways available to them.

For training and further education providers

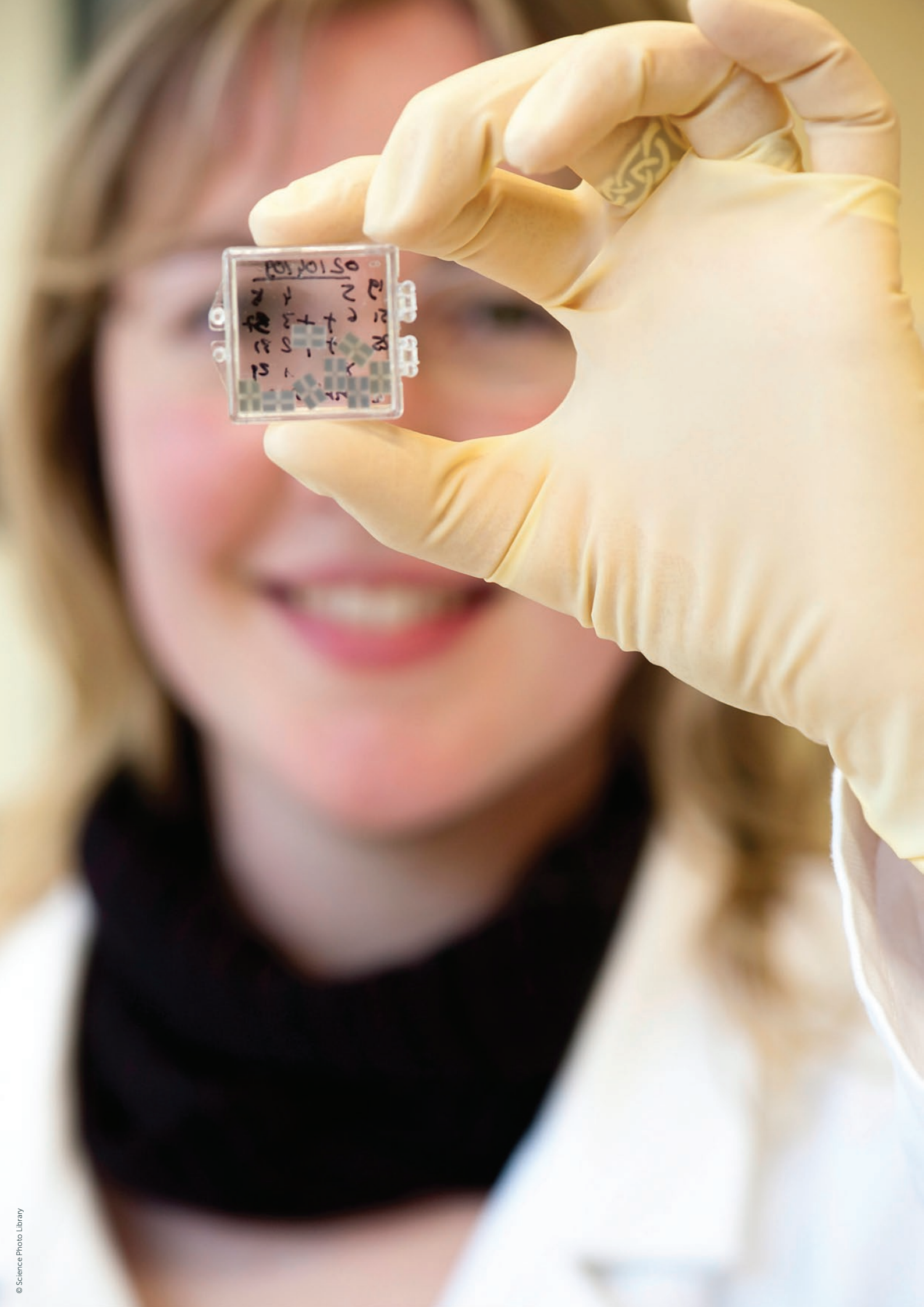
- Work with employers and professional bodies to ensure that courses contain the latest information on the industrial application of chemistry and its commercial aspects.
- Collaborate and share knowledge with training providers in close geographical proximity to avoid duplication and redundancy in the training provision for local employers, and to ensure training programmes are fit-for-purpose.
- Be flexible and responsive when engaging with employers; for example teaching outside of normal working hours, or achieving viable group sizes for a needed course by bringing small numbers of learners together from dispersed locations.

For professional bodies, societies and charities

- Offer guidance to employers on recruitment techniques that recognise vocational education.
- Develop an Apprentice Ambassador scheme that champions vocational education pathways.
- Develop a scheme to accredit further education courses and apprenticeships that are linked to professional registration.
- Promote professional registers RSci and RSciTech to schools, colleges and training providers.
- Promote any awards suitable for experienced technicians, and ensure they recognise mentoring and training of apprentices and early career technicians.

For qualification awarding organisations

- Work with employers and professional bodies to ensure that courses contain the latest information on the industrial application of chemistry and its commercial aspects.



Introduction

The chemical sciences, encompassing chemistry and chemical engineering, are a crucial component of our world-leading science base, a key contributor to the UK growth agenda, and an important vehicle for creating jobs. It is hoped that by 2030, the UK chemical industry will have further reinforced its position as the country's leading manufacturing exporter and will have enabled the chemistry-using industries to increase their Gross Value Added contribution to the UK economy by 50%, from £195 bn to £300 bn.¹

Employers, training providers, the Government, foundations and professional societies must work together to ensure we have the right supply of enthusiastic and highly skilled individuals who will be needed to drive growth in the high-tech chemicals and chemistry-using sectors in the UK.

A seminar organised by the Royal Society of Chemistry (RSC), Gatsby Charitable Foundation, the Salters' Institute and the Society of Chemical Industry (SCI) was held in June 2013 at Salters' Hall in London to better understand the current provision for technicians and scientists working within the chemical science industries. The seminar was attended by over fifty employers, training providers and stakeholders (appendix) and identified recommendations within the following six areas:

1. Pathways to technician roles.
2. Recruiting technicians.
3. Developing technicians within the work place.
4. Quality of work based training and vocational courses.
5. Sustainability of training.
6. Awareness and promotion of apprenticeships.

¹ *Strategy for Delivering Chemistry-Fuelled Growth of the Economy. UK Chemistry Growth Strategy Group, July 2013*

1. Pathways to technician roles

Young people equipped with vocational qualifications and whose skills are developed further through on-the-job training are advantageous to employers. However, there are a number of barriers within the system that have resulted in a weak vocational pathway to technical roles, namely:

- The complexity of qualifications and the associated funding regime.
- Accountability measures, which discriminate against vocational education.
- The inconsistent provision of training that meets industry standards.

It is essential that the development of vocational education takes into account the current and likely future needs of society and employers and the wealth of research evidence on the types of learning experiences that enable students to fulfil their potential.

We need to make sure that vocational courses are recognised as valuable in their own right and should complement, rather than compete with, traditional academic qualifications. They need to be fully integrated within a flexible, transparent system that allows students of all needs and abilities to combine the most suitable courses together in a way that allows them to fulfil their potential.

Quality benchmarking of vocational qualifications and removing the notion of equivalencies to traditional academic qualifications will be essential for raising the reputation of vocational qualifications and ensuring that vocational education is meaningful to both students and 'end users'.

Vocational training should enable trainees to progress towards a professional and recognised standard that promotes employability. Students should also be able to move easily between industry sectors once certain core skills have been attained.

Recommendations

For Government

- Ensure that every student is aware of the different, but equally valid, education pathways available to them.
- School and college performance tables should recognise vocational pathways and include employment destination measures.
- The quality of vocational pathways provided by schools and colleges should be measured by how well courses give students the skills and knowledge needed for employment or progression towards a specific occupation.

For qualification awarding organisations, training providers and further education providers

- Work with employers and professional bodies to ensure that courses contain the latest information on the industrial application of chemistry and its commercial aspects.



2. Recruiting technicians

The chemical science industries require skilled technicians but there are often difficulties associated with recruiting the right people for technical roles.

The term 'technician' can refer to a large spectrum of different roles, each with varying levels of knowledge and technical ability. Currently, the occupational descriptions that are used within vocational qualifications do not define the technician role in a consistent fashion. Consequently, vocational qualifications do not give employers confidence that an individual will be able to successfully perform in a specific role.

It is essential that a technician has a strong work ethic, since technical roles are usually fast-paced, requiring motivation and determination, and often involve a significant amount of repetition. These attributes can be difficult to assess during the recruitment process.

Another major issue facing the chemical science industries is "overskilling", whereby applicants for technical roles are overqualified for the position. A contributing factor to this trend is the increased number of unemployed chemical science graduates in the recruitment pool, giving rise to a large number of university graduates (or even individuals with a Masters qualification or PhD) applying for technical role vacancies.

There is a real risk of "overskilling" within a technician role by employing a graduate instead of supporting an individual to study a vocational course. It can lead to frustrated individuals who perceive limited development opportunities, which can also lead to unhappy employees, reduced staff retention and increased staff attrition.

These challenges can be overcome by using a recruitment strategy that is more appropriately tailored for technical roles. This strategy should include the assessment of technical knowledge and skill during the recruitment process, in addition to academic ability, to increase the likelihood of recruiting appropriately-skilled individuals.

Employers may also discover talented and enthusiastic individuals by working with colleges to offer work placement opportunities. Similarly, engaging with the Government traineeship initiative, which offers work experience to 16 to 19 year olds, provides an opportunity to discover young people who have the potential for a successful career in a technical role within the chemical sciences.

A Recruitment Case Study

Macdermid Autotype, an industrial manufacturer of coated films in Oxfordshire, was having difficulties recruiting the right person for a technical vacancy. When looking for a "local person with A Levels" to fill a technician role, they had received applications from individuals with Masters qualifications and even an applicant with a PhD. They have also had concerns with their future capacity to upskill their technicians. In the past they have used local college courses but these are no longer provided. To overcome some of these challenges Macdermid Autotype has developed a "skills matrix" scheme within the organisation to recognise development opportunities.



Recommendations

For employers

- Encourage applications from individuals holding Registered Science Technician (RSciTech) and Registered Scientist (RSci) designations when recruiting new employees.
- Invest in and develop the skills capacity within a company's geographical region by offering work placement opportunities to local colleges; collaborating with small and medium enterprises (SMEs) to share training resource and knowledge; and taking part in careers days and science fairs at schools and colleges.

For professional bodies, societies and charities

- Offer guidance to employers on recruitment techniques that recognise vocational education.

3. Developing technicians within the workplace

In the current financial climate employers have recognised the need to “future proof” against potential staff changes. To reduce staff attrition, employee professional development is crucial for encouraging innovation, continuous performance improvement and increasing motivation.

Employee retirement, relocation and role redundancy means that there is a need to ensure that a sufficient number of staff are trained, or being trained, at all levels.

Training can be delivered on an impromptu basis. However, employers that have set up a formalised strategy or training scheme for upskilling technicians, or that have used the Cogent Developing Science Professionals programme have experienced many advantages:

- Performance and progression can be easily managed.
- Consistency of training across departments and sites can be assured.
- A flexible “pool” of technicians who can work across departments, depending on specific requirements, can be provided.
- A formalised scheme can be accredited for external recognition, giving assurance of quality.
- Trainers, assessors and mentors experience professional development, together with trainees.

A Professional Development Case Study

In 2011 LGC Group wanted to provide a science apprenticeship that could be delivered at four of their locations in various parts of the country. As no single college could do this, LGC Forensics approached CSR Group, a supplier of scientific training and products, to deliver the Laboratory and Science Technician apprenticeship. CSR Group now delivers the apprenticeship at each one of LGC’s four technical sites, across different functions of the LGC Group, with experienced technicians acting as mentors. The scheme has been accredited by the Royal Society of Chemistry and in April 2013 twenty apprentices graduated from the scheme and became Registered Science Technicians.

Recommendations

For employers

- Fully budget for employee professional development and use the RSciTech and RSci registers as a development opportunity for employees not holding these qualifications while providing recognition for employees that do.
- Collaborate with small and medium enterprises (SMEs) to share training resources and knowledge.

4. Quality of work based training and vocational courses

A deficiency of high quality training available to employees results in a system whereby individuals lack the skills needed to carry out their job competently. It is vital that internal company training is relevant to a trainee's role, while also providing the individual with the skills to further develop their career within the chemical sciences. Many professional bodies, such as the Royal Society of Chemistry and the Institution of Chemical Engineers (IChemE), accredit company training to ensure it is in line with the needs of the profession.

It is important that vocational qualifications taught by colleges and universities are developed with industry input to ensure the knowledge and skills being taught are relevant and valued by both employers and employees. Professional bodies have accredited degree programmes for many years to ensure they meet the needs of the profession and this should be extended to the further education system. Aligning vocational qualifications with professional registration provides a mechanism to facilitate this.

Trainers working in further education need to have the right chemistry expertise, be proficient in the teaching of chemistry, and have an appreciation of how chemistry is used in the chemicals and chemistry-using industries. Experienced technicians, including those approaching retirement, should be empowered to inform current teaching and to inspire the next generation of learners. Of equal importance, colleges must also have the facilities that enable learning and teaching to take place in an environment similar to that found in industry.

Recommendations

For employers

- Encourage experienced technicians to act as mentors, support teaching in colleges and represent vocational education on school and college governing bodies.

For qualification awarding organisations, training providers and further education

- Work with employers and professional bodies to ensure that courses contain the latest information on the industrial application of chemistry and its commercial aspects.

For professional bodies, societies and charities

- Develop a scheme to accredit further education courses and apprenticeships that are linked to professional registration.

5. Sustainability of training

Between 1996 and 2006 the number of UK educational establishments offering a part-time chemical science course (above QCF level 3) dropped from 34 to 8. As a result, many employers that offered vocational study to scientific employees in the past now no longer do so due to the reduced availability of courses.

Challenges associated with course sustainability are often geographical. Some areas of the country have little to no provision, whereas there are examples of concentrated pockets of provision which cause competition between local providers.

Employers are often frustrated by the lack of courses available to develop technicians; conversely many further and higher education providers are frustrated that they have had to close a course due to low student numbers. It is apparent that for a vocational course to be successful it has to be sustainable. In addition to ensuring the qualification is relevant and valued by employers and trainees, there are four main challenges associated with improving sustainability of training provision:

- Weak relationships between employers and providers. Course sustainability can be encouraged by improving communication and strengthening relationships between educational establishments and employers. University Technical Colleges (UTCs), for instance, focus on the training of 14-18 year olds and engage with local employers to develop the curriculum and provide work placement opportunities for trainees. Applying some aspects of this mechanism to the further and higher education sectors would be beneficial.
- Flexibility and relevance. Technical qualifications need to be flexible enough to appeal to the diversity of sectors within the chemicals and chemistry-using industries, yet remain relevant to ensure occupational competence.
- Distance learning. Distance learning can offer a more sustainable training mechanism than traditional classroom-based courses due to its wider geographical catchment area. However, there is often a negative perception of distance learning among employers that should be addressed. Employers often perceive classroom-based courses to be better structured and more supportive for their technicians and scientists, and the classroom as a more familiar learning environment. However, with advances in information and communication technology, distance learning now offers a very strong support structure for training together with a large breadth of online tools and utilities. Furthermore, blended learning (distance and face-to-face) provides an even better environment than distance learning alone.
- Complexity. It is vital that we reduce the perceived complexity of vocational pathways, especially apprenticeships, as employers often become frustrated with the number of intermediary bodies involved and the unclear structure of the current system.

Climax Molybdenum, a molybdenum producer and supplier in Stowmarket, has been affected by a reduced provision of vocational training. One of their employees, Will Sutton, was originally employed to work within the warehouse. A restructure of the organisation gave Will the opportunity to work within the laboratory as a technician. Recognising Will was performing to a high level in this role the company decided to support him to study for a Higher National Certificate in chemistry, followed by a degree, at Anglia Ruskin University on a “day release” scheme. Several years later, Will is now the Chief Chemist and looking at ways to develop and upskill two technicians. Unfortunately the course Will successfully completed is now no longer available.

Recommendations

For employers

- Invest in and develop the skills capacity within a company’s geographical region by offering work placement opportunities to local colleges; collaborating with small and medium enterprises (SMEs) to share training resources and knowledge; and taking part in careers days and science fairs at schools and colleges.

For Government

- Reduce the perceived complexity associated with apprenticeships and vocational qualifications by minimising the number of intermediary bodies involved.

For training and further education providers

- Be flexible and responsive when engaging with employers; for example teaching outside of normal working hours, or achieving viable group sizes for a needed course by bringing small numbers of learners together from dispersed locations.
- Collaborate and share knowledge with training providers in close geographical proximity to avoid duplication and redundancy in the training provision for local employers, and to ensure training programmes are fit-for-purpose.

6. Awareness and promotion of apprenticeships

The chemicals and pharmaceuticals sectors alone made up 1.9% of gross value added to the UK economy in 2011 (reaching £27 bn)², and in England 9.1% of employment is within the standard industrial classification code (SIC) for professional, scientific and technical activities. However, apprenticeships in this SIC code account for just 4.5% of all apprenticeships. More alarmingly, fewer than 4% of apprenticeships within this SIC code are within a science framework³. It is clear that awareness of apprenticeships in the chemical sciences needs to be increased.

Although the Technical Apprenticeship Service (TAS) are working to promote chemical science apprenticeships the chemical science community needs to work harder to increase recognition of the value of work based training. Vocational career paths should be seen as a choice that is as valid and on a par with more traditional academic routes.

There are already awards to recognise and promote technicians and apprentices in the chemical sciences, such as the Royal Society of Chemistry's Chemistry Technician of the Year award and the Salters' National Award for Science Technicians. However, there should be greater recognition for training and mentoring performed by experienced technicians, as it is critical this expertise is fed back into the system.

Recommendations

For employers

- Ensure more apprenticeships are made available to young people by taking advantage of grants and support mechanisms.
- Raise awareness of apprenticeships by exploring opportunities to promote individual success stories in the media, nominating apprentices for relevant awards and by encouraging recognised apprentices to act as ambassadors within the STEM Ambassador Network.
- Invest in and develop the skills capacity within local geographical region by offering work placement opportunities to local colleges, by collaborating with small and medium enterprises (SMEs) to share training resource and knowledge, and by taking part in careers days and science fairs at schools and colleges.

For Government

- Ensure careers advisors within schools and colleges have up-to-date information and can confidently and competently promote vocational routes as a valid career choice.

For professional bodies, societies and charities

- Promote professional registers RSci and RSciTech to schools, colleges and training providers.
- Develop an Apprentice Ambassador scheme that champions vocational education pathways.
- Promote any awards suitable for experienced technicians, and ensure they recognise mentoring and training of apprentices and early career technicians.

² Industrial Strategy: UK Sector Analysis, BIS, September 2012, <http://www.bis.gov.uk/assets/BISCore/economics-and-statistics/docs/112-1140-industrial-strategy-uk-sector-analysis.pdf>

³ Ipsos MORI. BIS Research Paper Number 123. Apprenticeship Evaluation: Employer. August 2013

Appendix:

'Technical skills needs of the chemical industry'
seminar participants, 11th June 2013, Salters' Hall, London

Name	Organisation	Name	Organisation
Dr David Barr	Royal Society of Chemistry	Ms Joanne Lyall	Society of Chemical Industry
Mr Richard Blakeley	Unionlearn	Dr Peter McKenna	Petrochem Carless Ltd
Mr Paul Booth	Society of Chemical Industry	Dr Andrew Nicholls	GlaxoSmithKline
Dr Duncan Broughton	AWE	Mr Ali Orr	Science Council
Dr David Brown	Institution of Chemical Engineers	Mr Neil Owen	Givaudan UK Ltd
Mr Richard Brown	South East Water Scientific Services	Dr Robert Parker	Royal Society of Chemistry
Dr Mike Bushell	Syngenta	Mr Jon Poole	Institute of Food, Science and Technology
Dr David Chaplin	Dr Reddy's Laboratories Ltd	Dr Steve Price	Argenta Discovery 2009 Ltd
Dr Graham Clarke	Bristol-Myers Squibb	Mr Daniel Sandford Smith	The Gatsby Charitable Foundation
Dr Peter Clarke	Mondelez International	Ms Jean Scrase	The Gatsby Charitable Foundation
Dr Allan Clements	CIEC Promoting Science	Dr Peter Shaw	Synthomer
Mr Malcolm Cunningham	BP Chemicals	Mrs Libby Steele	Institution of Chemical Engineers
Mr Philip Ellaway	City & Guilds	Mrs Audrey Strong	The Salters' Institute
Mr Stephen Elliott	Chemical Industries Association	Mr Harry Swan	Thomas Swan & Co Ltd
Mr Ken Gellion	Wirral Metropolitan College	Professor Joe Sweeney	University of Huddersfield
Mr Bob Green	Manchester Metropolitan University	Mr David Swinscoe	City & Islington College
Mr Jon Griffin	Association of Public Analysts	Professor K. Clive Thompson	Alcontrol Laboratories
Miss Anna Harris	MacDermid Autotype Ltd	Dr The Hon Alexander Todd	The Salters' Institute
Sir David Harrison CBE	The Salters' Institute	Ms Clare Viney	Royal Society of Chemistry
Ms Julia Hatto	Novartis Pharmaceuticals UK Ltd	Mr Steve Ward	Royal Society of Chemistry
Professor Sir John Holman	The Salters' Institute	Dr Janette Waterhouse	Highfield Pharmaceutical Consultancy
Dr James Hutchinson	Royal Society of Chemistry	Mr Steve Westcott	Melbourn Scientific
Dr Brian Iddon	Society of Chemical Industry	Mr Simon Wigington	National Apprenticeship Service
Dr Hilary Jeffreys	Actavis	Dr Jacquin Wilford-Brown	AkzoNobel (International Paint Ltd)
Mr Simon Jukes	LGC Ltd	Ms Joanna Woolf	Cogent Sector Skills Council Ltd
Dr Steve Lancaster	Domino Printing Services	Mr Jamie Wordie	The Salters' Institute
Miss Fleur Layzell	The Salters' Institute	Dr Christopher Wright	British American Tobacco Ltd

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