

# **Annual National Report on Chemical Education in the United Kingdom of Great Britain and Northern Ireland 2015-2016**

## **1. Abstract**

Several events in 2015/16 have had significant impact on Chemical Education including the EU referendum, consultations on the Teaching Excellence Framework (HE), and other political events. The RSC expanded its resources on LearnChemistry and refocused its work in this area to focus on curation of content.

## **2. National Education Policy**

**EU Referendum:** The result of the EU referendum has caused considerable uncertainty for scientific research but also has implications for chemistry education, and the RSC is keen to emphasise that we are committed to collaborating with people and organisations around the world to ensure high quality chemistry education at all levels.

**Higher Education in England:** A Higher Education and Research Bill is progressing through Parliament. This has implications for Education through the implementation of a Teaching Excellence Framework (TEF) designed to rank institutions on the quality of their teaching based on existing metrics and linked to future tuition fee increases. Subject specific levels are planned for future years. The RSC has contributed to consultations on this bill. It is likely that universities in other UK Nations will apply for recognition through the TEF scheme to ensure comparability across the UK.

**School Qualifications:**

**AS and A-Levels:** changes to the exam system has resulted in a new structure for A-levels (secondary school examinations in England and Wales and Northern Ireland) and teaching for AS and A-level Chemistry began in September 2015 with first results in September 2016 (AS) and 2017 (A). These emphasise exams at the end of the course (the previous system was modular) and other types of assessment used only for essential skills. AS levels are no longer intermediate qualifications that count towards the full 2-year A-level. In Chemistry a Practical Endorsement of laboratory skills sits

alongside the A-level. It is unclear how these changes will affect university admissions and whether the Practical Endorsement will become a widespread admission requirement.

**GCSEs:** Revised GCSE qualifications will begin in September 2016, including GCSE Chemistry and Combined Science (equivalent to 2 GCSE with a balance of chemistry, physics and biology). These changes involve new specifications, a new numerical grading system and no direct assessment of practical skills.

**National 4/5, Highers and Advanced Highers in Scotland:** The reforms to Scottish qualifications have continued to be embedded and the results from this year's exams have shown a further decrease in those taking chemistry. The new National 4 and 5 qualifications require more study hours than the Standard qualifications they replaced; consequently students have fewer subject options.

**Welsh Reform:** The school system in Wales is currently undergoing significant reform, including the development of a new curriculum. There are working groups looking at the areas within the curriculum, including one on Science and Technology.

**Teacher Training and Supply:** There continues to be a shortage of specialist chemistry teachers in England and Wales, and a recently Scottish universities have started to report vacancies on their initial teacher training programmes. The English Government have remained committed to financial incentives for chemistry graduates to train as teachers, including a scholarship scheme administered by the RSC.

**Vocational/Technical:** This is an area of significant change at present. Recent reforms to the apprenticeship model were intended to become more flexible, give employers greater control and place employers in the position of becoming educated purchasers. An Apprenticeship Levy will be introduced from April 2017 to encourage employers to take on more apprentices.

A detailed review of technical pathways for 16-18 has also been published, and adopted by the government (subject to budget availability). Learners who opt for vocational education can study a high quality programme either through an apprenticeship or through a f/t college based course (with work experience) that provides the skills employers need and value. 15 sector route-ways have been identified, including 'health and science'.

### **3. Events in Chemical Education**

The Secondary and Further Education Group held their second annual meeting at Sheffield University, and the Scottish Region of the Education Division continued their programme of meetings.

The annual Variety in Chemistry Education conference was held in conjunction with the Physics Higher Education Conference at Nottingham

University. The Higher Education Academy STEM conference was held in January 2016 in Nottingham and a new conference, Horizons in STEM education was held in June 2016 at Leicester University, both of which had contributions from Chemists.

A one day meeting – Methods in Chemical Education Research (MICER) was held at the RSC in June 2016, and has continued through a Journal Club. <https://micerportal.wordpress.com/>

The RSC's Chemistry Education Research Group and Tertiary Education Group continue to sponsor conferences such as MICER.

#### **4. Activities of the Royal Society of Chemistry**

The Royal Society of Chemistry continues to be the largest non-government supporter of chemistry education in the UK and Ireland. Through our schools partnership scheme, Learn Chemistry Partnership, we are actively in touch with over 60% of schools and colleges throughout the UK and Ireland to support the teachers of chemistry in those schools. Our national network of Education Coordinators work with teachers on a local level, including organising events such as industry visits, networking and collaborations with universities and promoting access to our resources and services.

The Spectroscopy in a Suitcase (SIAS) programme brings portable spectrometers into the classroom. Hosts across the UK and Ireland deliver free workshops in schools, using portable IR, UV-vis or NMR spectrometers. Since its pilot in 2008, SIAS has expanded to reach all corners of the UK and Ireland. We are now in partnership with thirty five hosts based in university chemistry departments and science & discovery centres nationwide. In 2015 they visited 660 schools and worked with over 21,000 students.

The 2015 Higher Education Teaching Award was given to Dr Patrick O'Malley (University of Manchester) for work in technology enhanced learning. <http://www.rsc.org/ScienceAndTechnology/Awards/HETeachingAward/2015-Winner.asp>

The 2015 Nyholm Prize for Education was given to Dr Nick Greeves (University of Liverpool) for the creation and development of ChemTube3D (<http://www.chemtube3d.com/>). <http://www.rsc.org/ScienceAndTechnology/Awards/NyholmPrizeEducation/2015-Winner.aspc>

A Curriculum and Assessment Working Group is exploring chemistry curriculum design and development, with current work focused on the curriculum at the 16-18 age range. The intention is to ensure that future curriculum and assessment reform reflects modern chemistry and that the students develop appropriate knowledge and skills.

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Vocational & Technical Education: A large focus of the RSC's work is on the professional awards; Registered Scientist and Registered Science Technician. The RSC has run talks and workshops for training providers and employers in order to raise awareness and encourage applications

The RSC has recently received approval to accredit vocational programmes that are delivered by Further Education providers. Based upon the same principles as degree accreditation, the RSC will provide accreditation for apprenticeships, HNCs, HNDs and Foundation degrees thus protecting the standards and importantly raising the profile of these important programmes

## 5. Publications

The Learn Chemistry web resources collection of resources, courses and data for Chemistry Education (all age groups) has grown to over 4000. In August 2015 we launched a Periodic Table app, which has been downloaded over 300,000 times in its first year. We've published a number of new online teacher professional development courses featuring hundreds of pages of content, animations, quizzes and more. We also launched new context and problem-based learning resources for undergraduate chemistry teaching in July 2016, the culmination of years of planning and input from authors and advisory groups.

Support for teachers of primary science has been completely overhauled, including new curriculum-linked content, and a series of popular history-linked science ideas webs. Our secondary school-level teacher support has shifted, importantly, from content creation to curation, and we've developed an improved quality assurance process to support that.

We also completed vital research into teacher needs in early 2016 which informed a renewed focus on curriculum-appropriate guidance and key skills for chemistry, including mathematics and practical skills. This work is helping to shape our work for 2017 and beyond. <http://www.rsc.org/learn-chemistry>

Education in Chemistry (<http://www.rsc.org/eic/>) continues to grow with the launch of a new e-Magazine format (<http://www.rsc.org/eic/e-magazine>) and with a blog (<http://www.rsc.org/blogs/eic/>). The audience for Education in Chemistry is educators at all levels, but mainly secondary and tertiary education. The RSC's education journal: Chemistry Education Research and Practice (<http://www.rsc.org/journals-books-databases/about-journals/chemistry-education-research-practice/>) continues to publish four editions a year. Of note is the themed edition on the development of key skills and attributes in chemistry education. The deadline for this is 9<sup>th</sup> January 2017 and the Guest Editors are Dr David McGarvey and Prof Tina Overton.

The RSC are also launching a suite of reference books reviewing key areas across chemistry education called 'Advances in Chemistry Education'. Proposals submissions are currently being sought: <http://rsc.li/aice>.

## **6. Liaison with the chemical industry**

~ 60% of employed members of the RSC are in industry/commerce, and many engage with education and outreach projects at a national or local level.

## **7. International and European Initiatives**

## **8. Other events and Activities**

For other activities, please see [www.rsc.org](http://www.rsc.org).

## **9. Name of delegate**

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