

Chemistry for All

Purpose: To provide an **update** on plans for dissemination of the Chemistry for All findings and to **note** the planned extension to the collection of data from the Chemistry for All student cohorts.

Background

The Chemistry for All (CfA) project is exploring and addressing barriers to participation in UK chemistry undergraduate study through a longitudinal five-year programme. The two longitudinal student cohorts are now in school years 11 and 12. Some of the Year 12 students left their schools to go on to a range of sixth form provision.

The Research

Survey data from over 4000 students has been collected annually, along with ethnography and student interviews at six schools. The early suggestion that students' aspirations to study non-compulsory science/chemistry in the future were strongly associated with their extrinsic motivation towards science (how science can help with their future lives/material benefit) has continued to be evidenced. Future aspirations are also linked with students' family science capital, advice/pressure to study science, participation in science extra-curricular activities, self-concept (students' ideas and beliefs about themselves) and science intrinsic value. Some teaching approaches, including practical work, are shown to have an association with future aspirations.

High aspiring girls are the more likely group to aim for a job in science. Students from the most disadvantaged backgrounds are the least likely to report positive attitudes to science, continued study in science or science-based careers.

A Year 11 female student, from a single-parent family and of Pakistani background, identified that participating in the CfA programme was directly related to her decision to take Chemistry A level.

Interviews indicate that participating in the activities has had a positive influence on students' views about chemistry, about the benefits of chemistry/science to their future life, chemistry knowledge and their future aspirations. Survey data suggest that participating in enrichment activities has increased one third of the participating students' confidence and interest in doing chemistry/science, and their knowledge of the benefits of a career in science.

Around one third of the CfA cohort report increased knowledge of the routes available to study science/chemistry post-16 and the careers available with a chemistry qualification; an increased belief that science/chemistry can be for them; and a better understanding of how science/chemistry relates to everyday life. 28% of students reported that taking part in the activities has inspired them to study science/chemistry post-16.

Activity providers

Student feedback collected by the activity provider universities (APs) supports the research findings, with university visits and practical sessions proving particularly popular with students. Liverpool John Moores University (LJMU) reports a high percentage of CfA students in the GCSE separate sciences groups. The APs have applied the learning from the ongoing research in developing their programme. For example, the integration of careers information into activities and attendance at parents' evenings builds on the idea of extrinsic motivation being important.

Challenges have included a lack of support by parents for evening events focussing on family involvement and the development of science capital. The CfA cohort has been split into different science sets as they start their GCSE courses, making it hard to maintain a continuous programme, and schools have been reluctant to release Year 11 students for extra-curricular activities. GCSE revision sessions organised by the APs have had some success, but communications with the partner schools continues to be very difficult.

Wider learning from this project includes ideas about maintaining relationships with 'hard to reach' schools, effective governance of outreach teams, the types of activities which are most popular with schools and students, and less obvious effects, such as the importance of participation in this project for undergraduate ambassadors.

The APs are discussing the potential legacy of CfA at their own universities: LJMU is already working on a new outreach project after winning funding from Shaping Futures. They attribute the funding success partly to their experience in CfA – so an indirect legacy for the RSC project.

Chemistry for All research extension

The Royal Society of Chemistry have agreed to fund a research extension to the current Chemistry for All project. The continuation of this work should allow the researchers to explore whether the changes the research team have detected so far in the Chemistry for All project translate into university course choices and to determine what circumstances/contexts allow the development of such change in students. This will give us a fuller picture on final destinations and attitudes of the students in the years after the interventions took place. The current research team, UCL, Institute of Education, will undertake this continuing the research until summer 2022, submitting a final report in spring 2023.

The key research questions we will explore further are:

- What impact has Chemistry for All had on students' attitudes towards chemistry?
- What impact has Chemistry for All had on students' choices post-18?
- What were the key drivers to choosing chemistry post-18?

The research extension includes:

- Collecting survey data
- Matching data to GCSE and A-Level results
- Follow up interviews with the original 36 students recruited in 2014
- Recruiting additional students from the CfA cohort in 2019/2020 to replace any students who have dropped out
- Recruiting an additional ten students from non-intervention CfA schools to act as a comparison group for those who were exposed to interventions.

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