

# **A Summary of the Research, Findings & Recommendations of *Evaluation of Bristol ChemLabS Outreach*, an MSc Thesis presented by Amanda Shaw at the University of Bristol in December 2009**

## **Short-term Impacts of Bristol ChemLabS Outreach**

- GCSE students attending a polymer chemistry day were asked to rate themselves on seven different facets of attitudes towards science, both before and after participating. Higher self-concept in science scores were observed for students after attending than before taking part in the day's activities. In the same study, males consistently demonstrated higher self-ratings on all attitude measures than females, both before and after the polymer chemistry day.
- After attending a Bristol University/Trinity College Dublin summer school, A-level students showed significantly higher ratings of overall academic self-concept than they did before the summer school began. There was however no significant difference in chemistry self-concept ratings for the A-level students before and after taking part in the summer school.

## **Long-term Impacts of Bristol ChemLabS Outreach**

- Investigation into the A-level chemistry exam performance of schools in the CHeMneT database indicated that schools participating in A2 spectroscopy visits had a larger percentage of students achieving an A to E grade than schools not attending the visits in two out of the three years studied.
- Investigation of data on applicants to the School of Chemistry at the University of Bristol indicated that schools that had engaged with Bristol ChemLabS outreach had a significantly higher average number of applicants than schools that had not engaged. Students from these schools were significantly more likely to be rejected for a place to study chemistry at the University of Bristol, but if offered a place tended to be more likely to accept it.

## **Teachers' evaluations of the impacts of Bristol ChemLabS outreach**

- Teachers that had attended Bristol ChemLabS outreach events with their chemistry students tended to indicate that their *objectives* in engaging students in the outreach related to developing students' learning and understanding. In contrast, they tended to indicate that their perception of the *impacts* for their students related to enjoyment, motivation and decision-making.
- Opinions of teachers were polarised on whether there were any observable long-term effects for students engaging in Bristol ChemLabS outreach. In particular, teachers from independent schools suggested there were no long-term effects, whilst teachers from state schools suggested there were, or that there may be but it was too difficult to assess.

## **Parents' Evaluations of the Impacts of Bristol ChemLabS Outreach**

- Parents with children attending a Bristol ChemLabS outreach event tended to indicate that their reasons for engaging their child in the event related to learning or their school studies. In contrast, they tended to indicate that their perception of the benefits for their child related to enjoyment and enthusiasm for science.
- Parents' opinions were divided on whether there were any long-term benefits for their child; some recognised specific benefits, while others felt it was too early or too difficult to tell. No parents indicated that they thought there were no long-term benefits.

## **Recommendations for Future Bristol ChemLabS Activities**

Analysis of the CHeMneT database indicates that schools involved are better performing than average (whether they have actually engaged in Bristol ChemLabS activities or not). Some events organised by Bristol ChemLabS are designed specifically for students already showing interest in science and are important to allow these students to experience practical work, facilities and teaching not usually available to them in their standard education. Other activities however are more focused on raising aspirations, and it is these activities which could be targeted towards more schools that may be in real need of aspiration raising, that wouldn't be likely to proactively get involved themselves.

Schools can participate in one or numerous outreach activities with Bristol ChemLabS, and amount of participation may be affected by various factors such as cost and time available. Considering that some schools may only participate in one activity per school year or less, it may be beneficial for participating teachers to be provided with guidance to maximise the benefits of outreach for their students, using both pre- and post-activity work. Bristol ChemLabS could potentially provide guidance on this, and highlight the importance of it to participating teachers.

## **Recommendations for Future Bristol ChemLabS Outreach Evaluation**

It is clear that the opportunities for evaluation of Bristol ChemLabS are vast. Short-term impact measurement is useful for gaining insights soon after events have occurred, and findings on attitudes towards science may prove increasingly useful as more is learnt about how such attitudes may be linked to behaviour. However, in terms of evaluating the impact of Bristol ChemLabS outreach on raising aspirations and related objectives, it seems that long-term evaluation is key.

Further research would be beneficial to develop the long-term evaluation techniques used in the research. It would be useful to collect more data from schools both within and external to CHeMneT, and increase the focus of analysis on individual activities and age groups. It would be useful to link admissions data with information collected from incoming graduate students on their experiences of outreach (both with Bristol ChemLabS and other providers), and also to consider application trends at other universities for comparison if possible.

Ideally, long-term evaluation using longitudinal methods may be very useful for evaluation, for example following the outreach engagement and science uptake and exam performance of a particular school (or group of students), and comparing with a control group over time.

The insights of teachers involved in Bristol ChemLabS outreach provided a rich source of information, and further development would be useful to attempt to understand the impacts of science outreach from a teacher perspective. Including teachers in CHeMneT who had not engaged, and teachers with no links to CHeMneT would be very useful to gain a wider insight into potential impacts.

## Research Conducted – in Brief

- Students attending a polymer chemistry day at the School of Chemistry completed an attitudinal questionnaire before and after their visit, measuring a number of different facets of attitude towards science.
- Students attending a chemistry summer school completed an attitudinal questionnaire before and after taking part, measuring self concept in chemistry and other academic areas.
- Data from schools in the CHeMneT database was analysed to compare schools that had and had not taken part in Bristol ChemLabS outreach activities, on measures such as chemistry uptake and exam performance.
- Admissions data from the University of Bristol's School of Chemistry was analysed to look for trends between students from schools that had and had not engaged with Bristol ChemLabS outreach.
- Teachers that had taken part in Bristol ChemLabS outreach activities were interviewed to understand their reasons for taking part and perceptions of effects for participating students.
- Parents of students attending a chemistry outreach day at the School of Chemistry were surveyed to assess their reasons for their child attending and their perceptions of effects.