

Ionic Liquids:
Green Fragrances
Project Pilot

2020-21 Evaluation
Executive summary

IONIC LIQUIDS
FOR



Project partners

About the project

Towards Greener Fragrances (TGF) is a collaboration between IRIS and the Ionic Liquids Laboratory (QUILL) at Queen's University Belfast (QUB).

QUILL worked with IRIS to develop the project, which provided post-16 students with a different perspective on chemistry, allowing them to experience the creativity of scientific research and learn how it relates to the real world. The project drew upon a winning combination of being within an emerging scientific field and accessible to students who have a real passion for higher-level chemistry.

Students gained hands-on research experience, which allowed them to work on chemical reactions studied at A-level, develop practical skills and gain insight into the research profession. Two QUB postgraduate students were responsible for planning, organising, running and writing up the project. Working directly with schools also contributed to the PhD students' own science communication expertise.

At the start of the project, schools were invited to a launch event at QUB to introduce the project, to stimulate students' interest and to give them an insight into life at the university.

Aims of TGF project

- To create opportunities for students to contribute to meaningful academic research in a chemistry-related field, replicating academic research in a school environment.
- To increase students' understanding and confidence in chemistry by contextualising the chemical sciences and showcasing the range of career opportunities in both academia and industry.
- To increase interactions between students and academic and industry professionals, helping to reduce barriers into further education and to promote chemistry research at QUB.

Aim of the evaluation

The aim of the pilot was to gather evidence that met the evaluation requirements of IRIS and the funding body and to refine the project. The focus of the evaluation was on:

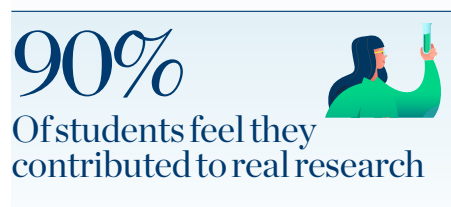
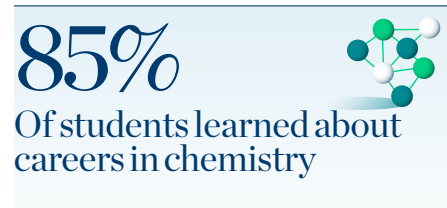
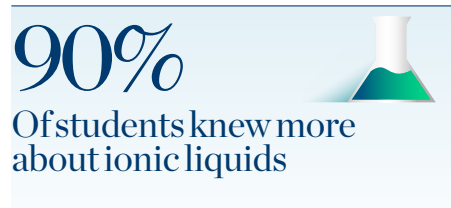
- The impact of the project on students, including attitudes towards chemistry, engagement with children experiencing disadvantage and interest in chemistry-related careers.
- Teachers' experience of running the project, including student engagement, support from QUB and IRIS and practical aspects.
- The experience of research scientists at QUB in supporting the project and achieving their outreach aims.

A mixed methodology was used, including baseline and post-participation questionnaires for students and teachers, supplemented by interviews with teachers, scientists and the IRIS project champion.

The schools

Four schools in Northern Ireland completed the pilot in 2022. Two schools were non-selective and two were selective grammar schools. The four schools had FSM6 rates ranging from 12% to 55%

Impact on the students



49 students took part in the project. 37 of these completed a baseline survey and 21 completed a post-participation survey.

Students were very enthusiastic about their experience on the project. Students appreciated that the project was more practical and hands-on than their normal school science and that they were able to go beyond the curriculum. Students also enjoyed working with peers and having the opportunity to express their ideas.

“I felt more involved in this project and got to express my own ideas. We also got to tailor parts of the project that weren’t working. I also felt when carrying out the research I was helping increase scientific knowledge instead of repeating a rigid experiment from a textbook.”

Student

Students appreciated the experience of collaborating with scientists from QUB which they felt gave them an insight into the work of real scientists. Working with others beyond their school was also a motivating factor in completing the project.

“They were all very nice and very passionate about the project which made us more determined to complete it.”

Student

All the students surveyed would recommend the project to a friend.

“It was a great experience and allowed me to have more insight into chemistry as a career and see what research is like such as literature analysis of papers and chemical analysis. It was also very enjoyable to be involved in more practical work and lab skills outside of the ones learnt in the classroom. This also prepared me for my university application.”

Student

Impact on teachers

All the teachers involved felt that the project had encouraged students to work collaboratively and that their students had fun doing the project. Most teachers (four out of five) also felt that the project set science in a real-world context, helped students develop research skills, increased engagement and motivation in science, provided stretch and challenge for the most able students and helped students develop a deeper understanding of some curriculum content.

“It encouraged them to be creative and problem solve. Students who would not necessarily be the best academically had a chance to shine as some of them were much better organised and good at problem solving and working together. They loved that there was no right answer and that they could adapt what they were doing as the results suggested.”

Teacher

Impact on teachers *continued*

Most, if not all, teachers felt that students had developed key skills in managing their own learning and acquiring analytical, critical and creative thinking as well as problem solving. Teachers recognised that the project supported a wide range of abilities and helped students develop a broad range of skills through the different roles that students could take on as part of the project.

“The one thing that I really noticed, the groups who I would have felt were more successful weren’t necessarily the groups with the most able students, but they were the groups who were the most organised and who really developed their organisational skills.”

Teacher

Teachers also felt there was an enormous benefit to meeting scientists from QUB and being part of a project based around real-life science.

“They were really enthused by what they heard from [one of the PhD students], she was so enthusiastic about the potential of what she was working on that it was really catching.... The PhD students were really helpful and it was particularly inspiring to them that one of them was a past pupil.”

Teacher

“It gave the students the feeling they were part of something important. The initial lecture was fascinating and while the students worked on one very minute part, they could see how their work could fit into a bigger vision.”

Teacher

Teachers also reported personal benefits from participating in the project such as developing different ways of delivering practical sessions or incorporating learning about greener production. However, teachers acknowledged that they encountered challenges such as time and limited access to equipment. Despite some challenges, all the teachers would recommend the project and wanted to run it again.

“The project actually exceeded all of my expectations because it was so relevant, it was so on the button, the way Queens have come over, have welcomed us in, you know let us run the NMR, let the students into the labs, really given them a full flavour of it’. ‘We needed some more elements of bringing in the real chemistry world into the classroom, to the students and this just worked. This was ideal.”

Teacher

All teachers were keen to use the project to inspire younger students and were planning on producing displays of the project, encouraging the students to present to new post-16 students and discuss the project with younger students in a science club.

Impact on our partner

Key benefits of working with IRIS included school reach; high-quality resources; school liaison; and the support that IRIS gave to PhD students, drawing on the organization’s extensive experience in teaching and working with schools. The project has helped raise the profile of the university. QUB also felt that model for the project was successful and that they would be able to replicate with other potential partners.

“it’s a virtuous circle if we can promote the university and [IRIS] can support us to promote science and research and that’s how they’ve seen it at Queen’s, it’s very much a kind of symbiotic relationship.”

Teacher

Acknowledgements

IRIS would like to thank our partners at Queen’s University Belfast for making this project possible. We are very grateful to the students and teachers at the schools for their participation and feedback. We would also like to thank the RSC education coordinator in Ireland for providing support to schools.