The Institute for Research in Schools

2021/22

IMPACT REPORT

IRIS

Contents

2021–2022

Director's letter
Dr Jo Foster
Director

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Director
The Institute for Research in Schools

The 2021-2022 academic year has been a challenging one for schools and colleges. Students who have had a significant amount of time out of an educational setting have needed support to find their feet again, and schools have rightly prioritised emotional health and 'catch-up' provision.

Despite the challenging backdrop of the post-pandemic return to school, IRIS has nearly doubled student engagement, with over 1,500 students across the UK participating in a research project while in school or sixth form college. More importantly, as evidenced in our surveys, students said that taking part in real research was life changing.

It isn't just students who benefit from participation in real research. Teachers told us that their involvement in our projects reminded them of how much they enjoy science and motivated them to stay in the teaching profession. At a time when teacher retention is such an important issue in the UK, this is a critical aspect of the impact of our work.

IRIS Student Conferences 2022 were a huge success, with over 400 young researchers presenting their projects at London, Bradford and Edinburgh events. The quality of the research was fantastic, with many visiting academics being bowled over by the students' work. The buzz of so many students sharing and enjoying each other's projects was a joy to witness.

We, at IRIS, believe that the excitement of authentic research should be available to every young person in the UK. Pleasingly, this year around 80% of students involved in IRIS were from state-funded schools. However, we need to go further to ensure the wealth of talent in the most challenging schools, and the opportunities that exist across all roles in STEM, are not lost. IRIS wants to capture this talent for the benefit of the students, the science community and the UK economy.

To spread good practice in education more widely, we have developed a toolkit for schools that supports every secondary school to select the most impactful ways to improve their STEM provision . We think this approach is a gamechanger for schools and colleges. There's more about our rollout of the STEM Research and Innovation Framework nationally on page 18.

We hope you enjoy reading about the impact that IRIS has had this year. I'd like to take the opportunity to express sincere thanks to the Battcock Charitable Trust, whose support makes this work possible.

Making strides

We want to change the culture in UK education so that *authentic research and innovation* is part of every young person's experience.

This is how we did *this year...*

94
Schools ran IRIS projects

177
Research projects carried out

The Institute for
Research in Schools

Schools

1,557
Students took part in IRIS research

Student
Dixons Sixth Form, Bradford
Project: Ionic Liquids

"It's an amazing experience which every student should have."

Student
Queen Elizabeth's School, Barnet
Project: Original Research

"It built on our foundations in A-level maths and furthered our programming skills in Python, reinforcement, and machine learning."

2,600
Hours of support, guidance and engagement opportunities to teachers and students

Headlines for 2021/22

Our impact in numbers

79%

Of IRIS students attend state-funded secondary schools, sixth forms or colleges

52%

Of students carrying out research through IRIS are girls

47%

Of students carrying out research for an IRIS physics-based project are girls

IRIS' ongoing impact and reach →

375

The number of UK schools and colleges involved in IRIS since 2016

423

Students and teachers attended the IRIS Student Conferences 2022

70%

Of research posters submitted for the conferences were created by students from state-funded schools, sixth forms or colleges

78%

Of students registered to attend the annual IRIS Student Conferences were from state-funded schools, sixth forms or colleges

80+

The number of universities and institutions we've collaborated with on research opportunities for young people

2,700+

The number of students, teachers, researchers and wider STEM community members that have participated in our conferences since 2018

6 OF THE 8

IRIS research projects help to meet 6 of the 8 Gatsby Benchmarks

Impact on teachers

Our evaluation shows that IRIS renews teachers' passion for STEM.

"With ever growing pressure on teachers, IRIS is a breath of fresh air that has supported students and staff in our school to conduct research that would never be possible without their help."

David Fairclough
Science teacher
St John Fisher Catholic Voluntary Academy

88%

Of teachers said working with IRIS helped them communicate the excitement of science to their students

69%

Of teachers felt working with IRIS influenced their approach to teaching

47%

Of teachers said that working with IRIS supported their motivation to stay in teaching (33% were neutral)

(From our 2022 survey, n=75)

"Research skills are our students' most valuable currency and that's what they learn with IRIS."

Sarah-Jane Linkman
Innovation Lab Manager
Liverpool Life Sciences UTC

"IRIS research cultivates their enthusiasm for science and their science skills beyond the curriculum."

Alice Stafford
Science teacher
Silverdale School

The impact teachers saw on students: →

3/4

Of teachers saw an increase in students' enthusiasm and motivation for science through IRIS projects

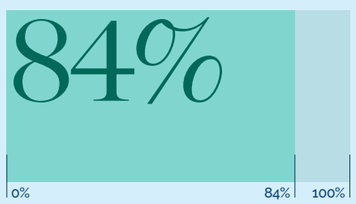
89%

Of teachers said that working with IRIS increased students' science capital

Skills for the future workforce

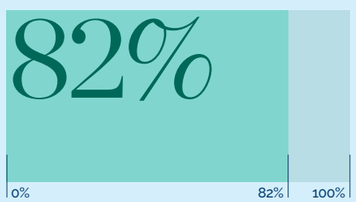
The World Economic Forum's *Future of Jobs Report 2020* explores the expected outlook for technology adoption, jobs and skills in the next five years. The report identified key skills needed by future employers.

Teachers say that students show improvement in these key skills after taking part in IRIS projects, more specifically:



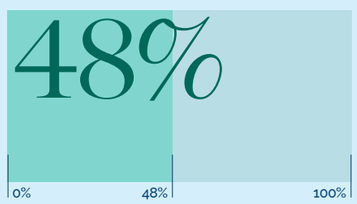
84%

Of teachers reported improvement in students managing their learning



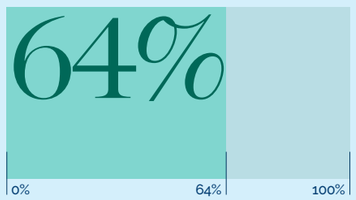
82%

Of teachers saw developments in students' analytical thinking



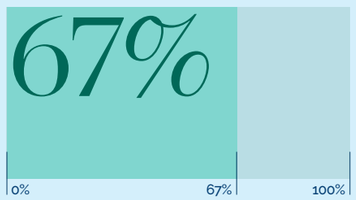
48%

Of teachers say IRIS helped improve students' creative thinking



64%

Of teachers noted an improvement in complex problem solving



67%

Of teachers say IRIS helped improve students' critical thinking skills

(From our 2022 survey, n=75)

Impact on students

The experience of scientific research *enriches young people's* wider education.

Students who carryout research learn to think *more critically and engage more deeply* in their subjects. They grow more confident in their abilities to *understand and explore the world.*

"We have really enjoyed being involved in IRIS and our students have gained so much from it."

Dr John Dyer
Science teacher
Liverpool Life Sciences UTC

Impact on students *continued*

"It has helped me to get a thorough feel of a complete academic research project, which will be really useful going ahead, as I wish to gain a PhD in a physics specialism."

Surayyah
Bordesley Green Girls' School and Sixth Form
Project: Original Research

How did our projects change how students feel about science?

Science careers: →

70%

Of students feel that there are exciting opportunities for them in science careers

(All student data from our 2022 survey, n=286)

"Instead of just reading from a book, I had the chance to figure out what works and doesn't. So the learning stuck with me."

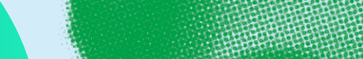
Camryn
Limavady Grammar School
Project: Ionic Liquids

"IRIS has given me insight into being a scientist. I want to go into the medical field so I can make a difference to the world."

Ayd
Lampton School
Project: Original Research

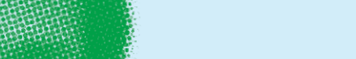
71%

Improved their awareness of science job opportunities



78%

It helped 78% of students know what it is like to work in science



99%

Of students who did an IRIS project think being a scientist is an interesting career

Impact on students *continued*

"Finding the motivation to work on our IRIS research project hasn't been as much of an issue than if we were working on a school project we didn't choose. Because we're interested, we always come back to it."

Jashwanth
Queen Elizabeth's School, Barnet
Project: Original Research

Science capital:

89%

Of teachers said that working with IRIS increased their students' science capital

"IRIS provided lots of tools and tips that helped us build our confidence in using the software."

Darcy
Silverdale School
Project: Earth Observation

"It helped me find out what I like doing, what career I might go into and what university courses I want to take."

Tapiwa
Liverpool Life Sciences UTC
Project: DNA Origami

78%

Of students involved in IRIS projects said they now know how science can help solve real world problems

3/4

Of teachers saw an increase in enthusiasm and motivation for science in their students through IRIS projects

97%

At the end of their project, nearly all students agreed 'people like me are scientists', compared to 61% at the start

Impact on science

If given the chance, young people can contribute to science while in school.

Here's some of the progress students have made in the name of science during the 2021-22 academic year.

"It was a nice introduction into particle physics, even before we had learned it at school"

Sanjay
Student
Wilson's School

Big Data: ATLAS

Skill level:
Advanced

Partners:

Age suitability 16+

We developed and piloted Big Data: ATLAS in partnership with the University of Oxford and the Rutherford Appleton Laboratory. Around 60 students from six schools were introduced to analytical and coding methods used by particle physicists. Students said they developed critical skills in statistical analysis, Python computer programming, data presentation and interpretation of ATLAS Open-Source data. Two groups even found evidence of the Higgs Boson.

"The quality of work these students produced is amazing, making incredible progress."

Tom Welton
Professor of Sustainable Chemistry, Imperial College London
President of the Royal Society of Chemistry

Ionic Liquids: Greener Fragrances

Skill level:
Moderate/Advanced

Partners:

Age suitability 16+

We piloted Greener Fragrances in Northern Ireland with Queen's University Ionic Liquids Laboratories – the most established centre dedicated to studying the compounds. Around 50 secondary students immersed themselves in current research, discovering how they can use science to solve real world problems.

"It's fantastic to see students' work. The quality has been amazing"

Dr Alex Ball
Head of Division, Imaging and Analysis, at the Natural History Museum

Scanning Electron Microscope

Skill level:
Beginner

Partners:

Age suitability 12+

Twelve schools carried out innovative research using portable scanning electron microscopes (SEM) on loan to them through our partnership with Hitachi High-Tech, Oxford Instruments, the Natural History Museum, the Royal Microscopical Society and Queen Elizabeth's Grammar School in Kent. A further 32 connected to them remotely. A student from Liverpool Life Science UTC won the Big Bang's Young Scientist of the Year award for her investigation of bird feathers using an SEM.

Impact on science *continued*

"It has helped me to get a thorough feel of a complete academic research project, which will be really useful going ahead, as I wish to gain a PhD in a physics specialism."

Surayyah
Student
Bordesley Green Girls' School
Unravelling the Mystery of Ultra High Energy Cosmic Rays

Original Research

Skill level:
Advanced

Age suitability 14+

Around 265 students from 16 schools chartered their own course with original projects. We were most impressed with Surayyah, student from Bordesley Green Girls' School, who produced a high-quality piece of scientific work that will add to current knowledge on cosmic rays. With the support of IRIS, she wrote a scientific paper which we're working to get published.

"I've been really blown away by the dedication of all the students. They've produced so much useful data and have quickly picked up an incredibly difficult skill interpreting spectra from telescopes"

Dr Ciaran Fairhurst
Public Engagement Officer
Science & Technology Facilities Council

Cosmic Mining

Skill level:
Moderate

Partners:
James Webb Space Telescope
UKRI Science and Technology Facilities Council

Age suitability 14+

Students from 45 UK schools carried out research in the advanced field of spectral analysis. Their work contributes to the first fully classified catalogue of these sources, which will be an extremely valuable resource for astronomers. Their work could possibly lead to the identification and selection of potential targets for the James Webb Space Telescope - the most powerful and complex space telescope to ever be built - which launched in December 2021.

Our supporters

We wish to thank all our *funders, partners and contributors* in aiding our *continued success.*

Battcock Charitable Trust

Bragg Centre for Materials Research, University of Leeds

Carbon Footprint

CERN

Centre for Polar Observation and Modelling

Henry Royce Institute

Open University

The QUILL Research Centre, Queen's University Belfast

The Royal Commission for the Exhibition of 1851

Science Museum Group

Science Technology and Facilities Council

SENSE – Centre for Satellite Data in Environmental Science

STEM Learning

University College London

UKRI MRC Integrative Epidemiology Unit, University of Bristol

University of Cambridge

University of Oxford

Weil

Wellcome Sanger Institute

Wellcome Trust

UK Space Agency

Future ambitions

This report shows the tremendous impact authentic research has on teachers and young people when it is part of their school experience. Students are more engaged and motivated and start to identify as young scientists, teachers get the chance to share their excitement for science and young people of all backgrounds begin to see science as a rewarding and interesting career.

We want to change the culture in UK education so that authentic research and innovation is part of every young person's experience. Over the next year, we'll continue to work towards realising our ambition by engaging directly with school leaders and spreading good research practice more widely.

For school leaders aspiring to develop a culture of research and innovation in their schools, navigating the multitude of information and support available can be daunting. Our toolkit – the STEM Research & Innovation Framework – provides school leaders with the information they need to reflect on current practice and signposts the organisations that can support their development.

We hope the Research & Innovation Framework helps school leaders develop a culture of research and innovation in their own schools, supporting young people into STEM careers, building science capital and bringing the magic of real research to as many young people in the UK as possible. A copy can be downloaded for free from researchinschools.org

Over the next year, IRIS will pilot the Research & Innovation Framework in 10 UK state secondary schools to see what the impact of this approach is on a school-wide scale. We hope that this will be the start of an extensive programme to bring this approach, where real research is part of every young person's experience, to thousands more students in the UK over the next few years.

Dr Jo Foster
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Notes

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