In giving evidence to the House of Commons Science and Technology Committee the Institute for Research in Schools (IRIS) would like to highlight the progress it has made in addressing the STEM skills gap. (Further information about IRIS below)

1 By engaging in frontline science and engineering students master skills of handling data. For example, in our TimPix programme students have the opportunity to study thousands of frames of data representing the radiation environment on the International Space Station. Five examples are given below about how this approach has begun to address the STEM skills gap.

- One comprehensive school in Sheffield took all the data with a different approach and mapped on a world grid all the points where there were zero counts of radiation. In doing this they came across a problem they saw with the data where NASA had a bug in the system. At first NASA said they understood this fault and NASA asked the students for their analysis. This bug was far more common and significant than NASA had realised and hadn’t been addressed in NASA’s data processing.
- Students from another IRIS school found that in analysing data from these detector chips they needed to be able to run major computer analysis and they were able, through Queen Mary University of London to get Grid certification – this is access to the CERN computing grid to run processing jobs. This has developed their ability to handle big data.
- Students in an IRIS school wrote a huge software platform to analyse the data from these detector chips and this is now being used by CERN.
- A student in an IRIS school decided the best way to analyse this detector data was to develop machine learning. His work is now used as a basis for developing machine learning more widely in this analysis field.
- Students involved in major IRIS projects not only are engaged in a sustained interaction with cutting edge science, engineering and data but they need to present their work at conferences and so learn skills of communication, collaboration, problem solving, public speaking, self-confidence, team working. See the IRIS introductory video [http://www.researchinschools.org/video.html](http://www.researchinschools.org/video.html) An Introduction to IRIS

2 By engaging schools students in real world science and engineering we begin to equip students with the skills they need which enables them to consider scientific careers (for example one parent said of her daughter at a physics University interview – she sounded like a physicist talking with the physics tutors – this particular student had done a piece of research on dark matter – contributing to analysis of galaxy clustering. To do this she had taught herself python programming and competently went on to study physics)

3 Tackling the STEM skills gap is one of IRIS’s key aims with many students engaging in analysing big data, coding, presenting, developing as competent team players, prepared for the challenges of science and engineering with resilience and experience.

4 We also give teachers the training and skills to know about current research and developments and help their students with better careers advice and guidance on the skills. For example Transport for London asked us to help in their data analysis. We trained the teachers and now are developing a national project on TfL data and data presentation.
Written evidence submitted by The Institute for Research in Schools (GAP0016)

Background to the Institute for Research in Schools (IRIS)

IRIS makes cutting edge research projects open to school students and their teachers so that they can experience the excitement and challenge of science. We do this by making data accessible to schools and also by lending out kits. Students have so much to contribute and who knows what amazing contributions they will make. We have found that teachers too are reinvigorated, appreciate this professional development and also find that it makes the experience of teaching much more enjoyable.

IRIS is a UK registered charity and in the nine months since launch we have over 280 schools signed up with teachers loving the chance to do real science alongside their students with the support and resources of IRIS. We run research symposia and CPD and have a resource bank on our website. Empowering young people to genuinely contribute in science increases their aspiration, their confidence and their enjoyment of science and enables them to be more aware of scientific careers.

We are developing programmes across a number of areas including space science, particle physics, material science, transport, marine science and biomedical science. We have a number of national research projects on going, and our project TimPix, measuring the radiation field on the International Space Station has recently been promoted by NASA to US schools https://www.nasa.gov/feature/high-school-students-use-nasa-data-to-analyze-astronaut-radiation-exposure-in-space

Amongst our supporters are universities, learned societies and industry and our champions Lord Martin Rees and Professor Sir Leszek Borysiewicz. Partner schools such as St Paul’s Way Trust in Tower Hamlets report increased aspiration and university success with their student researchers. Partner schools report IRIS gives increased knowledge of careers in STEM and the opportunities open to young people. We are developing metrics to evaluate the impact on our six key indicators – ACCCCE – Aspiration, Confidence, Continuation, Contribution, Collaboration and Enjoyment of Science. We realise we are significantly enhancing students’ soft skills of communication, critical thinking and creativity and helping open their eyes to the possibilities and demands of science.

How is IRIS different to other STEM initiatives?

1 A mechanism for collaborative research in cutting edge topics: school students aid in the data analysis and acquisition
2 Genuine student contributions at the forefront of science and engineering: students aren’t just repeating experiments
3 Reinvigorates teachers and connects them and their students to the careers and excitement in STEM
4 Longitudinal and not “whizz-bang”: the work is ongoing in a sustained way and the experiments don’t always work
5 This project makes a platform for other scientists in universities to engage with students and help them in their research - building networks that will become increasingly important in the young person’s career. A number of post docs and PhD students have been happy to have this framework so that they can go into schools to work on an existing project.
6 Run festivals/symposia: Allow students to share ideas, speak and present their work alongside academic researchers in that field and collaborate with other schools.

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