Big Data: ATLAS

Evaluation summary

Big Data: ATLAS

IRIS The Institute for Research in Schools

About the project

The ATLAS detector is used by physicists to observe the results of proton-proton collisions in the Large Hadron Collider at CERN in Geneva, the largest collider of its type in the world. Big Data: ATLAS introduces to students the techniques used to analyse ATLAS data, giving them the chance to explore their own questions in particle physics.

Developed by IRIS, in collaboration with the University of Oxford and the Rutherford Appleton Laboratory, the project is designed to support students who may not have come across particle physics or computer programming before or who are keen to develop their knowledge.

Young people learn analytical and coding methods. They develop critical skills in statistical analysis, Python computer programming, data presentation and interpretation of ATLAS open-source data, including how to find evidence of the Higgs boson.

Student registrations

Big Data: ATLAS has been a long-standing IRIS project, predominantly attracting post-16 students.

	21-22	22-23	23-24	24-25
Number	63	280	213	272
Post-16	89%	81%	74%	89%
Female	-*	39%	37%	30%

*Data on gender was not collected until after 2022

Methodology

Data on the running and impact of the project has been gathered from the pre and post IRIS evaluation survey data since the inception of the project.

Item	23-24	24-25
IRIS pre-participation survey	200 students	211 students
IRIS post-participation survey	86 students 22 teachers	116 students 31 teachers

Impact on students

This project supported students to:

- develop skills in carrying out research
- learn to analyse complex information
- understand more about STEM
- understand more about working in STEM and as a science researcher
- explore new areas of STEM

Students said that they:

- found the project interesting, challenging, and fun
- appreciated the in-depth insight gained into this field of physics
- were positive about the resources and guidance provided

"I very much enjoyed the freedom to conduct research in small groups, free from a curriculum and without predetermined results."

Year 12, male student

"It was one of the most interesting projects I've ever undertaken and even sparked my passion into physics."

Year 12, female student

"It can be difficult at first, when faced with a ton of new information to learn and skills to pick up, but you'll learn so many new and interesting things once you get into it, so it's well worth doing. You get a real taster into what doing academic research is like, which you don't really get anywhere else."
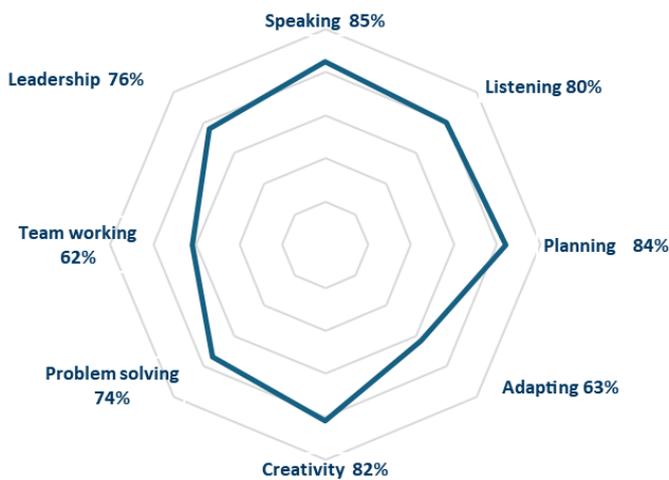
Year 12, female student

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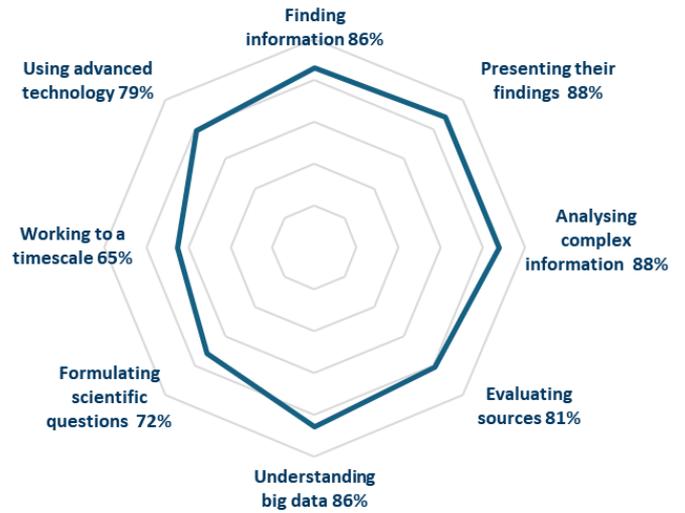### Impact on students' skills development

The project sought to replicate an authentic research process and the students recognised that while aspects were difficult, it gave them a real insight into doing research and facilitated skills development and knowledge acquisition.

87% of students agreed that they developed important skills that will help them in the future.

Through the project, students agreed that they had improved their research skills…

Speaking 85%
Listening 80%
Leadership 76%
Planning 84%
Team working 62%
Adapting 63%
Problem solving 74%
Creativity 82%

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…and their transferable skills

Finding information 86%
Presenting their findings 88%
Using advanced technology 79%
Analysing complex information 88%
Working to a timescale 65%
Formulating scientific questions 72%
Evaluating sources 81%
Understanding big data 86%

"It was a good way to learn new skills, gain more interests, learn about interests and collaborate more."

Year 12, female student

"It is a great opportunity to gain experience doing real research and also to gain experience working in small groups and presenting your research at conferences."

Year 12, male student

"Absolutely amazing to improve your research skills, and gain some really valuable, relevant knowledge."

Year 12, female student

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Understanding of STEM and research

The project helps students to feel more positive about research and STEM. Students felt they…

85% …can make a valuable contribution to research

84% …understand research can be hard work but is rewarding

The project had helped students to explore areas of STEM beyond the classroom. Students…

89% …know how STEM can make a difference in the real world

96% …know about STEM beyond the school curriculum

"It helps you to understand complex parts in subjects in depth. It also gives you skills that is really useful in your career and life."

Year 12, male student

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Future career impact

Students told us that the project:

- opened their eyes to different aspects of physics and programming
- increased their interest in a career involving STEM
- helped them to see that research was an interesting career

Students felt they…

86% …have a better understanding of what it might be like to study STEM at a higher level

80% …agreed that being a researcher would be an interesting career

80% …know about a range of different STEM careers

"This project has encouraged me to seek out more STEM careers and to educate myself further in these complex subjects."

Year 12, female student

"It gives you an insight of future science research careers and why it is effective."

Year 12, female student

"It helps to have better understanding of STEM careers and things beyond your scope of learning."

Year 12, female student

"I enjoyed learning beyond the curriculum and working on something relevant to my future career."

Year 12, female student

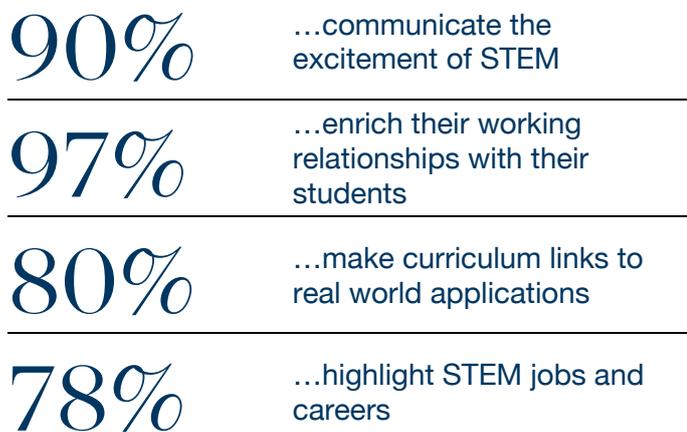IRIS The Institute for Research in Schools

Impact on teachers

Teachers described how the project provided a unique opportunity to stretch their students, to deepen their own knowledge and to help them to enrich lessons with research-based activities.

Teachers reflected that the project:

- helped students to feel like real researchers
- improved students' awareness of STEM careers
- developed a deeper understanding of the curriculum

Teachers found that running the project helped them to…

90%	…communicate the excitement of STEM
97%	…enrich their working relationships with their students
80%	…make curriculum links to real world applications
78%	…highlight STEM jobs and careers

"It encouraged me to incorporate ideas and attitudes to science into my day-to-day teaching."

Teacher, state school

"It continues to be a worthwhile project that really helps support our high achieving students and those with STEM aspirations. It is exceptionally useful for student's CVs as they move forward."

Teacher, state school

Science & Technology Facilities Council
Rutherford Appleton Laboratory

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