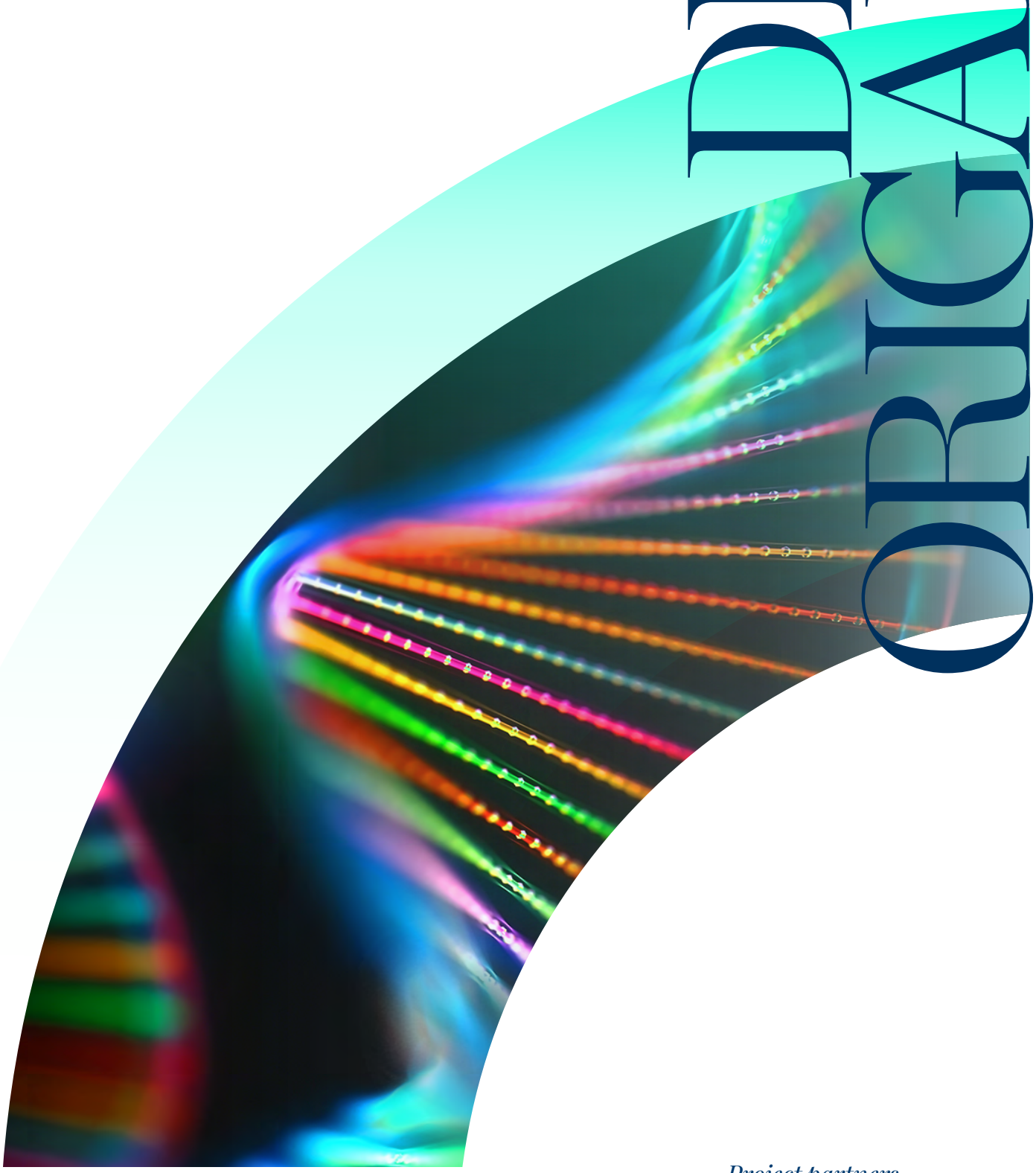
DNA Origami

2020-21 Evaluation
Executive summary

DNA ORIGAMI



Project partners

IRIS The Institute for Research in Schools

the BRAGG centre FOR MATERIALS RESEARCH

HENRY ROYCE INSTITUTE

About the project

DNA Origami a collaboration between IRIS and the Bragg Centre for Materials Science at the University of Leeds and was funded by The Henry Royce Institute. The project allows young scientists to explore the exciting new world of DNA nanotechnology. The project is based on the concept of the Japanese art of origami, whereby students learn how to fold DNA to create new and unusual shapes using computer software. They work alongside researchers to investigate the potential applications for this self-building, designer material.

DNA Origami provides a fun introduction into material science, a place where biology, chemistry, engineering, maths and physics converge. It allows budding scientists to uncover, first-hand, how this field of science has the potential to revolutionise our lives and provide potential solutions to global challenges.

The aims of DNA Origami are to:

- Provide an insight into materials science for secondary school students
- Present students with an opportunity to take part in some high-level scientific activities broaden their science curriculum and develop their skills

DNA Origami was evaluated in 2020-21 to:

- Understand the impact of participation in the project on students.
- Explore the teachers' experience of running the project.
- Assess the experience of partner scientists

A mixed methodology was used, including baseline and post-participation questionnaires for students and teachers, supplemented by teacher interviews and student focus groups.

The schools

Five schools started the pilot in October 2020. All schools were all non-selective and state academies or state secondaries. The five schools had FSM6 rates ranging from 18.2% to 57.3%, with three schools being above the national average of the FSM6 rate.

Impact on the students

90% Had a better idea how science could help in the real world

80% Knew more about DNA nanotechnology

75% Knew more about material science

80% Were interested in doing independent research

75% Had a betterawareness of the career opportunities in science

75% Almost 75% were more interested in a career in science

51 students started the DNA Origami project; 45 students were in Year 12 and 6 in Year 11; 35% of students were female. Twenty students took part in focus group interviews which explored their experience of taking part and the impact of participation.

Students were very enthusiastic about their experience of this project. They said that it gave them a chance to work differently, to see how science works in the real world and they learned that science is an interactive, collaborative and creative process.

Impact on the students
continued

While it required persistence to overcome setbacks, students found the process well worth it for the skills they gained and the satisfaction of getting their end result.

"It was problem solving. There were no mark schemes... You have to actually take this problem and dissect it and then work around those different sections."
Year 12 Student

Students were excited to be working at the cutting edge of materials science and DNA nanotechnology and it was eye-opening for them to discover what can be done with new technologies to progress scientific knowledge. They could see that work in this area had many important applications in the real world. It gave them experience of working in science and showed them that there are many opportunities in scientific research. It also helped them believe that they could contribute to this progress.

"It helped me broaden my horizons, and think yeah you know, this is the role of science, and this is very broad and applicable, and it breaks down boundaries, different sciences helping each other."
Year 12 Student

Impact on teachers

Teachers were impressed by how well the students worked together on the project. In addition, they enjoyed the challenge of learning about advances in materials science and DNA nanotechnology. It put them back in touch with science research and reminded them of the camaraderie of working together on a project, helping them to develop a different relationship with students as they all worked together to learn something new.

"I've never seen students work so effectively together in a group, to be honest, it was phenomenal."
Teacher

Teachers told us that they were able to use what they had learned in their teaching, and some stressed how working on the project enhanced their enjoyment of their teaching role. Teachers also worked across curriculum, drawing on, and learning from, the expertise of their colleagues.

Impact on our partner

Key benefits of working with IRIS includes local and national school reach; high-quality resources; school liaison and being able to draw on IRIS's extensive experience of schools and teaching. The project has helped raise the profile of the Centre within the University and in local and national schools. It has enabled the centre to contribute to the University's strategic outreach aims and has increased co-operation with other departments and faculties.

Acknowledgements

IRIS would like to thank our partners Henry Royce Institute and the Bragg Centre for Materials Research at the University of Leeds for making this project possible. We are also very grateful to the students and teachers at the schools for their participation and feedback.