DAVID & JANE RICHARDS FAMILY FOUNDATION

The **David** & **Jane Richards** Family Foundation

DJRFF is a UK registered charity set up to advance the education of computer science and ecology in state schools. It aims to inspire young people to fulfil their potential through hands-on programmes and targeted assistance.
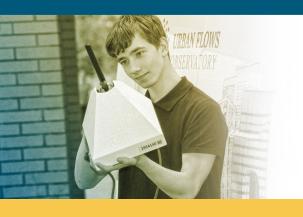
David is the founder, chief executive and chairman of *WANdisco*, a public software company jointly headquartered in Silicon Valley and Sheffield. He and wife Jane have donated shares to fund *DJRFF*'s work.

Challenge for schools and employers

Digital skills are becoming increasingly important to employment and understanding the world around us. Demand for data scientists and data engineers in particular has more than tripled over the last five years, according to the Royal Society. Schools and colleges in Yorkshire and the Humber have the lowest student uptake of computer science at GCSE and A level in the country, according to the Roehampton Annual Computing Education Report, creating a significant disadvantage for the region's young people.

Solving this problem

Starting in Sheffield, DJRFF's new syllabus transforms the way computer science is taught in classrooms. It focuses on data science to give young people the ability to understand and solve real world problems. With programming at risk of automation, the emphasis is on creativity rather than coding.

Launching the course

DJRFF approached Tapton School with a proposal to pilot the programme. Tapton embraced the opportunity and included the course in their Year 9 options programme. More than 50 students signed up to study the syllabus, with two classes starting in September 2018. DJRFF devised the course and provided detailed educational materials, hardware such as Raspberry Pi microcomputers and environmental sensors, one-to-one teacher training and technical support.

Inspiring students

Students learned how to use data to make predictions for the future. Pre-eminent business school professor Chris Brady, an expert in sports business, delivered entertaining and informative lessons on how performance can be improved through the use of data analytics using the 2018 World Cup as an example.

They were exposed to the technology that helps Britain's athletes in their quest to break world records. Students spent the day with Dr Sarah Churchill, a leading sports scientist at Sheffield Hallam University, who gave them hands-on experience with the same high-tech equipment that researchers use with elite athletes and professional teams.

Students set up their own Internet of Things network at Tapton School for connected devices to gather real-time data about the environment in Sheffield. This information was analysed to yield new insights about living in the city. They worked with Sheffield's Urban Flows Observatory and students from Sheffield Engineering Leadership Academy on fun applications to reduce pollution and improve quality of life.

End of year presentations

In the final module of the course, students devised their own data gathering projects and used the Raspberry Pis and environmental sensors to solve real world questions and challenges before presenting their findings to their teachers and peers. The diverse and innovative topics chosen are illustrated by the examples below.

Is Tapton Haunted? Students discovered that Sheffield has the fifth highest number of Google UK searches for 'haunted'. They placed sensors around the school to monitor any unusual phenomena. They visualised the data using Tableau data analytics software and found a drop in light and temperature at a corresponding time. The students thought this might have been paranormal activity but concluded it was more likely a light switch being turned off.

Badminton Data Project: Fans of the sport at the school wanted to improve their performance so attached sensors to their legs to monitor movement and identify any trends that led to winning games. They also recorded start time and the identity of players. Analysis of the resulting data showed the greater the movement detected, the more likely the player was to lose.

The main outcomes

In the first year, 53 students signed up for the pilot Year 9 course, which was delivered across two classes. In the second year, 82 students signed up for the course, encouraging the school to increase provision to three classes. This shows increased demand for computer science education from students at Tapton School since the launch of the DJRFF course.

The proportion of females choosing the Year 9 course increased as well, rising from 15 per cent to 29 per cent. This compares favourably against the national average of 20 per cent for GCSE computer science.

The proportion of students choosing GCSE computer science at Tapton School has increased since the launch of the DJRFF course, from 23 in 2018-19 to 27 in 2019-20, representing a rise of 17 per cent.

Tapton School also reported increased interest in A-level computer science in 2019-20 with the largest class for a number of years.

Following the successful pilot, DJRFF scaled up its computer science syllabus for schools in September 2019, partnering with Astrea Academy Trust to introduce new courses at four of its secondary schools across South Yorkshire.

In addition, King Edward VII, a large secondary school in Sheffield, is running an eight-week course for its Year 8 students.

In their own words...

The course offers great learning opportunities that would not otherwise be available to students, and situates learning in engaging, real-life contexts.

Lessons include a lot of challenging activities to help students take learning to the next level and the outstanding lesson materials are great to use.

The course provides an excellent opportunity for students to gain knowledge of industry tools. For teachers, this is a great opportunity for subject knowledge enhancement and learning.

Course Teacher

This was a step change for computing education in school with an absolute focus on engagement and enjoyment in learning.

The course was successful in attracting students who might not otherwise have been interested in the subject. They learned how computing is changing lives and had hands-on experience of creativity, innovation and entrepreneurship.

We are proud to have worked with DJRFF on the pilot course and have embedded it in our school curriculum for Year 9s.

David Dennis
Chief Executive of the Tapton School Academy Trust

We learned about the types of jobs available and the different roles within companies, which was inspiring.

It showed us how everything we are learning in class is applied practically in a workplace. I understand more about how Big Data can be displayed to make it more visual.

Student

The trip to Sheffield Hallam University was great; it showed us hands-on how professionals analyse data in sport so we could link it to lessons.

We all got a feel for what it is like to be a university student and the ways that undergraduates might use data analysis in their studies.

Student

I was impressed with the ideas students came up with, which showed a great level of knowledge, understanding and detail. Their questions were of a standard you might expect from some undergraduates.

Learning how to analyse data does not mean you can only become a data analyst. It means you can broaden your horizons because data analysis can be applied to anything and everything.

Dr Sarah Churchill
Course Leader for Sport and Exercise Technology at Sheffield Hallam University

Students enjoyed thinking about the world in different ways. They liked being able to learn new software and discovering new technology they didn't know existed.

Classroom Assistant