Explore the IET Faraday Challenge at theiet.org/faraday
IET Faraday Challenge Days 2019-2020 Review

The IET Faraday Challenge team began delivering a record-breaking 210 Challenge Days across the UK this season. However, due to the COVID-19 pandemic and the government's decision to close schools in March 2020 we had to cut the season short and innovate. Despite this we are proud to have delivered 76 IET in-school events, 3 events at our Academic Partner universities and thanks to the generosity of our supporters, a further 54 funded events throughout the UK. That's a total of 134 IET Faraday Challenge Days with 320 schools and 4,493 students involved.

Our supporters and sponsors this year included Airbus, Jack Petchey Foundation, Keith Thrower OBE FREng FIET, Kitronik, Motorola Solutions Foundation, NATS, Queen Mary University, The Reece Foundation, Science & Technology Facilities Council, Tesco and Whitaker Charitable Trust.

We will prioritise the undelivered challenge days to next season and look forward to visiting the schools that missed out this year.

The theme for the 2019-2020 season was in association with Airbus. Teams of six students were given the task of developing a product which would support the work of Airbus in delivering support to international aid organisations and humanitarian causes. Their product could either help Airbus transport aid or help people in times of need. They had to take into account key considerations such as weight, energy, flexibility and sustainability.

After designing and building the prototype, which had to include an electrical circuit, they presented their ideas to the judges, teachers and their peers.

Students were scored throughout the day on their planning and research; development and functionality of the product; use of budget; how they met the demands of the area/environment; the final presentation, and their teamwork and attitude throughout.

Members of each winning team won a gift voucher for themselves, a trophy for their school, and had their score added to the national league table.

The National Final was due to take place at the Airbus Facility in Bristol on 8 July 2020, but unfortunately couldn't go ahead as planned either.

With families facing a lengthy period at home we rose to the challenge and adapted ours into a Virtual Faraday Challenge. We have opened it up for anyone from 7 to 15 years, with the option for young people to take part at home, in school, individually or as a group/family. This gave many young people who had missed out on taking part this season the opportunity to still get involved as well as many more!
Quotes from professionals

David Lakin
IET Head of Education

“We were delighted to have Airbus as this year’s theme partner, the challenge this year not only tasked students to be creative in assisting the Airbus team in helping transport aid and help people in times of need but also gave students the opportunity to work like Airbus engineers tackling real-life problems.

“There is huge demand for new engineers and technicians and I’m confident that this challenge has helped to change young people’s perceptions of engineering and inspire the next generation of engineers and technicians. Our IET Faraday Challenge with theme partners, such as Airbus, give students an insight into the life of a real engineer, the variety a career in engineering can offer and just how exciting and creative engineering really is.”

Helen Andrews
Executive Assistant to the International Senior Leadership Team, Motorola Solutions Foundation

“With employees located around the globe, Motorola Solutions seeks to benefit the communities where it operates. The Motorola Solutions Foundation achieves this by making strategic grants, forging strong community partnerships and fostering innovation. One of the focuses for its funding is education, especially in technology and engineering. The IET Faraday Challenge provides the perfect partner and the skills the young people have to use are those needed for the future of our company.

Several of our employees have had the good fortune to take part in some of the Challenge Days and they were all impressed by the teamwork the young people demonstrated, their amazing problem-solving capabilities and their inventiveness.

The IET Challenge Days are a very positive response to the UK shortage of future engineers.”

Keira Sewell
IET Challenge Leader

“Despite being cut short, the 2019-2020 Faraday Challenge Day season was a great success. As Challenge Leaders we have always known that one of the strengths of students who take part in the Challenge is their focus on humanity and their strong desire to help others. The partnership with Airbus this year has enabled students to really bring together their creativity and their humanity to help those in need following a disaster.

This year the brief was broader than ever, enabling students to consider both how aid is transported to areas of disaster and the types of aid people might need. They did not disappoint! As usual, our initial ideas of what they might design and engineer were rapidly overtaken and it was common for Challenge Leaders to report back students’ ideas, exclaiming ‘I’d never have thought of that’. What became particularly interesting were the ways students’ designs reflected ongoing situations around the world. For example, we saw several prototypes designed to help animals displaced or in danger due to the catastrophic fires in Australia and the rescue of livestock in areas of flooding.

As usual, students showed great enterprise and innovation when selecting their equipment from the shop. It was the teachers who had concerns, often drawing the Challenge Leader to one side to explain that their students may not be able to use the electronic equipment available as they had only done a small amount on circuits. However, the power of trial and error, supported by a few documents to scaffold their success and a great deal of perseverance worked wonders and the teachers watched in amazement as their students confidently used such components as light dependent resistors and servo motors in their designs and then went on to explain resistance in their circuits. Interestingly, by this point many of the teachers’ teams had fallen by the wayside and lapsed into drinking coffee and eating biscuits!

This was my eighth year of being a Challenge Leader on Faraday and I continue to consider it a great privilege. We get the opportunity to see students grow in confidence throughout the day, ever more willing to take risks and put forward their own ideas (no matter how mad they might appear!) Long ago I learnt not to say ‘can’t’ to a team but simply to say ‘try it’. It never ceases to amaze me how many of them do things I thought were impossible. What a pleasure to spend my days learning with some of the most creative and innovative minds around. I can’t wait to see what they achieve in the future”
Headline statistics from the full season

No. of events: 134
No. of students: 4,493
No. of schools: 320 (including 1 Pupil Referral Unit)
Engaged with 47 schools defined as hard to reach (high percentage of free school meals, rural schools and social mobility indicators).

Student feedback

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge 98%
- I learnt new things 96%
- I now understand more about what engineering is 95%
- I have a better idea about what engineers do and the skills they need 94%
- Before today I was considering studying or working in engineering 34%
- Following this event I am now considering studying or working in engineering 58%
- I’d like to do something like this again 95%

70% increase in students who after taking part in a Faraday Challenge Day would now consider studying or working in engineering.
Student quotes

"I really liked this experience as it opened up a new career path for me."
12 year old boy

"Today was great fun and I learned lots of things. This was definitely a highlight of my school year."
12 year old boy

"Throughout the day, I've learnt so many new things and enjoyed doing so. I came closer to my peers and learnt that engineering is more than building houses! Thank you to all who made this day as fun and as enjoyable as it was. I'd love to do it again."
12 year old girl

"I loved this challenge, it gave me a greater understanding of what engineering is and how it relates to everyday life."
12 year old boy
Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements. Information gathered from 393 teachers:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years 100%
- The interest of the students was retained throughout the day 99%
- The students learnt new concepts and expanded their knowledge base 100%
- The registration process was straightforward with enough time to plan for the event 100%
- I would be interested in taking part next year 100%
- I would recommend the IET Faraday Programme to other teachers 100%

Teacher quotes

"A really fun, good day for the children. Expanding their knowledge of 4 subjects – science, technology, maths and design – to real life needs. Thank you."

"Excellent day. Students had a great time and it genuinely opened their eyes to careers in STEM."

"Absolutely fantastic event, very well structured and planned. The students were kept interested and minds stretched."

"Students practically learned in a pressurised realistic situation, how to create and build different prototypes and improve their knowledge and understanding of scientific concepts. They were inspired to compete with each other and teams about what engineers really do."
Special thanks

Faraday Challenge Days really do inspire students and raise the profile of STEM overall.

The IET Faraday Challenge has this year reached more young people thanks to the generosity of engineering, technology and science companies and charities who have funded individual events or contributed towards the core IET events and online teaching resources.

A huge thank you to you all.

The next generation of engineers will have better skills thanks to their IET Faraday experiences and thanks to you.
Airbus

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<tr>
<th>Date</th>
<th>Host school</th>
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<tr>
<td>13 November</td>
<td>Barnwell School</td>
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<td>14 November</td>
<td>Admiral Lord Nelson School</td>
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<td>4 December</td>
<td>Baycroft School</td>
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<td>5 December</td>
<td>Christ the King College</td>
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<td>6 March</td>
<td>Wirral Grammar School</td>
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<td>Hawarden High School</td>
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<td>11 March</td>
<td>Bay House School</td>
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Student feedback

Age: 12: 116 (51.3%), 13: 104 (46%), 14: 5 (2.2%), Not specified: 1 (0.5%)
Gender: Male: 102 (45%), Female: 122 (54%), Not specified: 1 (1%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge 98%
- I learnt new things 99%
- I now understand more about what engineering is 97%
- I have a better idea about what engineers do and the skills they need 94%
- Before today I was considering studying or working in engineering 36%
- Following this event I am now considering studying or working in engineering 58%
- I’d like to do something like this again 93%

No. of events: 7
No. of students: 226
No. of schools: 17

Student quotes

"I found the use of the shop was very clever as it challenged us to pay attention to how much we used and spent, like in real life."

13 year old boy

"It was really fun and would love to do it again to learn more about all things engineering."

13 year old boy

"Loved today. Learnt a lot. Brought the team together. The energy in the room was amazing."

12 year old girl

"Enjoyable and informative but really challenging too."

12 year old girl
Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years: 100%
- The interest of the students was retained throughout the day: 100%
- The students learnt new concepts and expanded their knowledge base: 100%
- The registration process was straightforward with enough time to plan for the event: 100%
- I would be interested in taking part next year: 100%
- I would recommend the IET Faraday Programme to other teachers: 100%

Teacher quotes

"The students gained a lot and were stretched throughout the whole day."

"Really good day, students responded really well to the challenge."

"Very engaging presentation - students challenged to problem solve and find solutions themselves!! Love the extra challenge at the final questioning."

"Students were very engaged and pushed out of their comfort zones."
IET Academic Partners

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<th>Date</th>
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<tr>
<td>16 January</td>
<td>University of Plymouth</td>
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<td>4 February</td>
<td>Queen Mary University</td>
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<td>14 February</td>
<td>Loughborough University</td>
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<td>25 February</td>
<td>Teesside University</td>
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No. of events: 4  
No. of students: 87  
No. of schools: 9

Student feedback

Age: 11: 4 (5%), 12: 46 (53%), 13: 36 (41%), Not specified: 1 (1%)  
Gender: Male: 59 (68%), Female: 27 (31%), Not specified: 1 (1%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge 100%
- I learnt new things 100%
- I now understand more about what engineering is 94%
- I have a better idea about what engineers do and the skills they need 97%
- Before today I was considering studying or working in engineering 34%
- Following this event I am now considering studying or working in engineering 70%
- I'd like to do something like this again 98%

Student quotes

"It was really good and interesting to learn about engineering." 12 year old girl

"I enjoyed the aspect of problem solving as well as the team working aspect." 13 year old boy

"Good experience, taught me new things." 12 year old boy

"This day was fun and practical and I also learnt new things." 12 year old girl
Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years 100%
- The interest of the students was retained throughout the day 100%
- The students learnt new concepts and expanded their knowledge base 100%
- The registration process was straightforward with enough time to plan for the event 100%
- I would be interested in taking part next year 100%
- I would recommend the IET Faraday Programme to other teachers 100%

Teacher quotes

"Absolutely amazing event, very well organised. Our students have definitely benefited from the experience. Thank you!"

"Fantastic event, engaged students all day. Well organised!"

"Excellent day. Very well planned and delivered. It was successful in engaging students throughout the day and teaching them new skills."

"A great day of "learning" for our students."
### Jack Petchey Foundation

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<td>17 October</td>
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<td>18 October</td>
<td>Edmonton County School</td>
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<td>29 October</td>
<td>Royal Liberty School</td>
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<td>Jo Richardson Community School</td>
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<td>Malden Oaks PRU</td>
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<td>Nonsuch High School for Girls</td>
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<td>9 December</td>
<td>Park High School</td>
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<td>10 December</td>
<td>Bentley Wood High School for Girls</td>
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<td>8 January</td>
<td>Coombe Boys’ School</td>
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<td>9 January</td>
<td>Southborough School</td>
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<td>15 January</td>
<td>Sacred Heart High School</td>
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<td>16 January</td>
<td>Tolworth Girls’ School</td>
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<td>Grey Court School</td>
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<td>Newstead Wood School</td>
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<td>Sweyne Park School</td>
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<td>29 January</td>
<td>Eastbrook School</td>
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<td>Queen Mary University</td>
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<td>Dormers Wells High School</td>
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<td>27 February</td>
<td>Swakeleys School for Girls</td>
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<td>Kingsdale School</td>
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<td>The Petchey Academy</td>
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<td>12 March</td>
<td>Sarah Bonnell School</td>
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<td>13 March</td>
<td>Eastbury School</td>
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No. of events: **41**  
No. of students: **1,378**  
No. of schools: **68** (including 1 Pupil Referral Unit)
Student feedback

Age: 11: 3 (0.2%), 12: 760 (57%), 13: 547 (41%), 14: 5 (0.4%), Not specified: 19 (1.4%)
Gender: Male: 576 (43%), Female: 725 (55%), Not specified: 27 (2%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge 97%
- I learnt new things 95%
- I now understand more about what engineering is 95%
- I have a better idea about what engineers do and the skills they need 93%
- Before today I was considering studying or working in engineering 38%
- Following this event I am now considering studying or working in engineering 62%
- I'd like to do something like this again 94%

Student quotes

"The challenge was very fun and helped me understand more about engineering." 13 year old girl

"I think that everyone should have this opportunity due to what it can teach you." 12 year old boy

"I loved this challenge, it gave me a greater understanding of what engineering is and how it relates to everyday life." 12 year old boy

"This opportunity helped me discover what I can do and has made me consider engineering in the future as I do enjoy science and designing and putting my ideas forward." 12 year old girl

"I liked the idea of actually getting to manufacture our design, and all in 1 day. I gained a lot out of it." 13 year old boy
Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years 100%
- The interest of the students was retained throughout the day 100%
- The students learnt new concepts and expanded their knowledge base 100%
- The registration process was straightforward with enough time to plan for the event 100%
- I would be interested in taking part next year 100%
- I would recommend the IET Faraday Programme to other teachers 100%

Teacher quotes

"Fantastic day. Really inspiring. 100% recommended."

"Students showed a high level of engagement and motivation. Thank you."

"A really fantastic engaging day. Encouraging electrical engineering, design, maths budgeting and presenting skills. Thank you."

"Thank you so much for sharing your expertise with us all. All the pupils were really engaged and learnt A LOT! A brilliant approach to introducing new concepts. Thank you."

"It was absolutely wonderful for students to have a chance to engage with practical science so thoroughly with such great and well organised resources. Being creative with practical science was a great and unusual opportunity for them. More teachers should know about this so we can order parts online and embed such exercises in the curriculum - training probably required for some. I do think other sets (This was the top ability half of the year) would benefit from a slightly simplified version (more scaffolding would naturally probably be needed). So great, so well organised - it was brilliant!"
NATS

Date  Host school
10 January  Tomlinscote School

No. of events: 1
No. of students: 36
No. of schools: 1

Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years: 100%
- The interest of the students was retained throughout the day: 100%
- The students learnt new concepts and expanded their knowledge base: 100%
- The registration process was straightforward with enough time to plan for the event: 100%
- I would be interested in taking part next year: 100%
- I would recommend the IET Faraday Programme to other teachers: 100%

Teacher quotes

"Excellent activity, Many thanks"

Student feedback

Age: 12: 17 (50%), 13: 17 (50%)
Gender: Male: 16 (47%), Female: 18 (53%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge: 100%
- I learnt new things: 97%
- I now understand more about what engineering is: 94%
- I have a better idea about what engineers do and the skills they need: 94%
- Before today I was considering studying or working in engineering: 29%
- Following this event I am now considering studying or working in engineering: 65%
- I'd like to do something like this again: 91%

Student quotes

"It was really fun, and I learnt lots of new skills." 12 year old girl

"This was very fun and thank you for hosting this." 12 year old boy

"It helped with time management and working under pressure." 13 year old girl

"I thought the activity was fun and I learnt what engineering was and new things." 12 year old girl
Reece Foundation

Date | Host school
---|---
26 February | Emmanuel College
27 February | Emmanuel College

No. of events: 2
No. of students: 61
No. of schools: 10

Student feedback

Age: 12: 31 (51%), 13: 27 (44%), 14: 1 (2%), Not specified: 2 (3%)
Gender: Male: 30 (49%), Female: 29 (48%), Not specified: 2 (3%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge 98%
- I learnt new things 97%
- I now understand more about what engineering is 95%
- I have a better idea about what engineers do and the skills they need 97%
- Before today I was considering studying or working in engineering 41%
- Following this event I am now considering studying or working in engineering 56%
- I'd like to do something like this again 93%

Student quotes

“I really enjoyed this fun way of learning about engineering and would strongly like to do it again.”  
13 year old girl

“It was fun but also helped me learn more about engineering.”  
13 year old boy

“I enjoyed working as a team and hearing other peoples' thoughts.”  
13 year old boy

“I think it was a very good opportunity.”  
12 year old girl
Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years: 100%
- The interest of the students was retained throughout the day: 100%
- The students learnt new concepts and expanded their knowledge base: 100%
- Registration process was straightforward with enough time to plan for the event: 100%
- I would be interested in taking part next year: 100%
- I would recommend the IET Faraday Programme to other teachers: 100%

Teacher quotes

“Well organised/students were on task all the time/loved questioning of students’ decisions which added depth to their learning.”

“Great day. Well hosted with skillful and knowledgeable leader. Very attuned to needs and abilities of the students. Lovely host school.”

“Really enjoyed seeing students tackle the challenges and the outcomes. Students had to work without teacher support and really worked well.”

“Excellent day - Students really enjoyed it and definitely helped their independence, team skills and ‘thinking on their feet’. The host school was an excellent venue too.”
Date: 11 February  
Host school: Rutherford Appleton Laboratory

No. of events: 1  
No. of students: 30  
No. of schools: 5

Student feedback

Age: 12: 12 (40%), 13: 17 (57%), Not specified: 1 (3%)  
Gender: Male: 15 (50%), Female: 15 (50%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge: 100%  
- I learnt new things: 90%  
- I now understand more about what engineering is: 87%  
- I have a better idea about what engineers do and the skills they need: 83%  
- Before today I was considering studying or working in engineering: 20%  
- Following this event I am now considering studying or working in engineering: 40%  
- I’d like to do something like this again: 97%

Student quotes

"The Faraday challenge was very fun and really brought out your creativity to create something using a briefing just like an engineer."  
13 year old boy

"Really fun, challenging and enjoyable."  
12 year old girl

"I really liked this challenge and I learnt new things."  
13 year old boy
Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years 100%
- The interest of the students was retained throughout the day 100%
- The students learnt new concepts and expanded their knowledge base 100%
- The registration process was straightforward with enough time to plan for the event 100%
- I would be interested in taking part next year 100%
- I would recommend the IET Faraday Programme to other teachers 100%

Teacher quotes

"Excellent day. Great to see students overcome difficulties and solve problems."

"Fantastic day for the students - was thought provoking and challenging in a very positive way! Thank you!"

"Great brief – too many choices to get a specific idea but then again lots of students with different backgrounds create different outcomes. Thanks."
Keith Thrower OBE FREng FIET

Date | Host school
---|---
10 October | Waingels College
17 October | The Willink School

No. of events: 2
No. of students: 72
No. of schools: 2

Student feedback

Age: 12: 63 (91%), 13: 4 (6%), Not specified: 2 (3%)
Gender: Male: 32 (46%), Female 35 (51%), Not specified: 2 (3%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge 100%
- I learnt new things 100%
- I now understand more about what engineering is 99%
- I have a better idea about what engineers do and the skills they need 97%
- Before today I was considering studying or working in engineering 33%
- Following this event I am now considering studying or working in engineering 61%
- I'd like to do something like this again 96%

Student quotes

"I enjoyed this unique experience very much." 12 year old boy

"I think it was an amazing day and I now have more experience." 12 year old boy

"I really enjoyed today and would love to do this again. Also, I now have a better understanding of what engineers do." 12 year old girl

"Helps improve teamwork and gave me a better understanding of budgeting and technical issues that can hold the project back." 12 year old girl
Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements:

– The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years 100%
– The interest of the students was retained throughout the day 100%
– The students learnt new concepts and expanded their knowledge base 100%
– The registration process was straightforward with enough time to plan for the event 100%
– I would be interested in taking part next year 100%
– I would recommend the IET Faraday Programme to other teachers 100%

Teacher quotes

“Really loved how engaged the students were. Everything was planned and executed perfectly. Thank you.”

“An excellent challenge day that was well planned and delivered. Students were challenged throughout with direct questioning. Students were independently encouraged to use initiative and skill and were truly engaged. Thank you!”
The Whitaker Charitable Trust

No. of events: 1
No. of students: 36
No. of schools: 17

Student feedback

Age: 12: 14 (40%), 13: 20 (57%), Not specified: 1 (3%)
Gender: Male: 20 (57%), Female: 14 (40%), Not specified: 1 (3%)

The following stats represent the % of students who were in agreement with these statements:
- I enjoyed the Faraday Challenge 100%
- I learnt new things 97%
- I now understand more about what engineering is 97%
- I have a better idea about what engineers do and the skills they need 94%
- Before today I was considering studying or working in engineering 40%
- Following this event, I am now considering studying or working in engineering 74%
- I'd like to do something like this again 100%

Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements:
- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years 100%
- The interest of the students was retained throughout the day 100%
- The students learnt new concepts and expanded their knowledge base 100%
- The registration process was straightforward with enough time to plan for the event 100%
- I would be interested in taking part next year 100%
- I would recommend the IET Faraday Programme to other teachers 100%

"Student quotes"

"I quite enjoyed today and learning about different engineering jobs and problems."
13 year old boy

"I really enjoyed having to communicate with my team to design a prototype to make other peoples' lives easier."
12 year old girl

"I loved this day due to the fact we could build and buy to our hearts content. Utterly brilliant 9.5/10 (longer lunch and building time would make it 10/10)"
12 year old boy

"I enjoyed working all day to make something I'm proud of. Would LOVE to do it again!"
13 year old boy

"Teacher quotes"

"It was a fun day full of enthusiasm!"

"Great day - Thank you!"
Virtual Faraday Challenge

We decided not to let the school closures stop us from sharing this fantastic activity. Instead, we set about adapting this year’s Challenge into a Virtual Faraday Challenge and opened the competition up for anyone between 7 and 15 years, with the option for young people to take part at home, in school, individually or as a group or family.

Our theme, in partnership with Airbus, remained the same. We challenged young people to see if they could assist the work of Airbus in helping people around the world in times of need and work in the way engineers do in designing a new product. The Challenge Leaders recorded a special briefing video from home and set young people the task of demonstrating their engineering skills. We asked them to think of a solution and produce a design of their idea. If they also wanted to build a model of their idea they could.

Entries were submitted as a PowerPoint presentation and judged on how the design met the criteria in the design brief; explaining how the product worked and was constructed, appropriate use of electronic components and how the presentation was communicated.

The best entries received a prize and featured on our website.

No. of entries: 165
No. of participants: 257
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