November 2021

The Fusion (**https://fusion21.imanengineer.org.uk/**) ran from 1 November to 10 December and was funded by the **UK Atomic Energy Authority** and featured engineers working in the field of fusion energy.

Throughout November, Covid-19 cases in schools remained at an all time high. This meant there was less activity within the Zone than expected.

Key activity figures

	Zone	November 2021 average
Schools	6	8
Students logged in	167	221
Students active	81%	91%
Engineers	14	23
Questions asked	33	35
Questions approved	26	23
Answers given	90	110
Live chats	10	14
Lines of live chat	2,417	4,374
Average lines per live chat	242	297
Votes cast	57	104

Engineers

We invited 22 engineers to take part in the Zone. 14 of those created a profile in the Zone.

You can see who took part at **https://fusion21.imanengineer.org.uk/engineers**

The winning engineer with the most votes from students was **Jessica Korzeniowska**, Systems Engineer and DEMO Requirements Manager at UK Atomic Energy Authority.

Students

167 students from 6 schools across the UK logged into the Zone.

49% of active students were from target schools: 5% from underserved schools and 44% from widening participation schools.

Live chats

10 live chats booked by teachers for school classes took place during the activity. Additionally, there were 2 chats scheduled, open to all the students..

An additional 2 live chats were booked: one was cancelled and in one the school was unable to attend without cancelling.

There was one live chat where teachers asked questions on behalf of their students. It is also common for students to share login details or computers during live chats. Therefore, the number of students reached will be higher.

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School activity

Students from 6 schools across the UK participated in the Zone. In addition to live chats booked by teachers, there were 4 Thursday evening chats scheduled for the students and their families.

School	WP/U status	Active users	Chats attended	Chat lines (total)	Chat lines (per user)	Questions approved	Votes
St Bridget's Primary School & Nursery Class, Glasgow City	WP	59	2	748	13	4	18
Hull Collegiate School, Hull	-	45	3	235	5	2	23
Northampton High School, Northampton	-	26	3	252	10	19	9
Mallaig High School, Highland	U	7	1	68	10	0	6
St Ignatius Catholic Primary School, Sunbury on Thames*	-	1	1	49	49	0	0
Hornsey School for Girls, London	WP	1	0	0	0	1	0

** In these chats teachers typed questions on behalf of their students.*

We want to increase the participation of under-represented groups. Find out what we mean by under-served (U) and widening participation (WP) schools, and how you can support us in working with more of these: **about.imanengineer.org.uk/under-served-and-wp**

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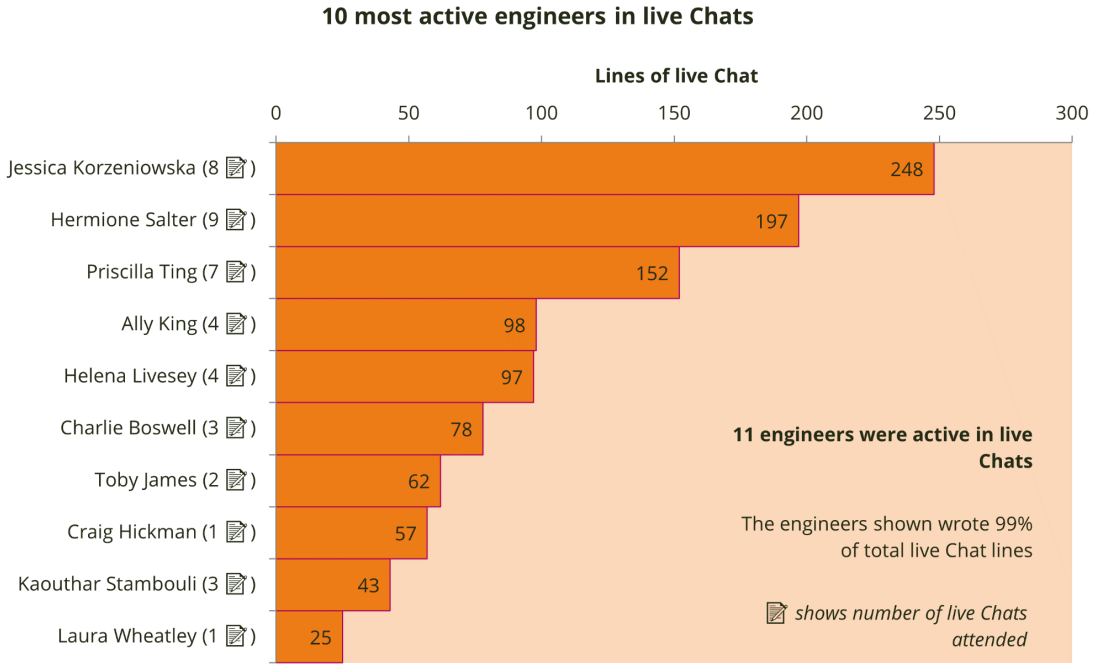
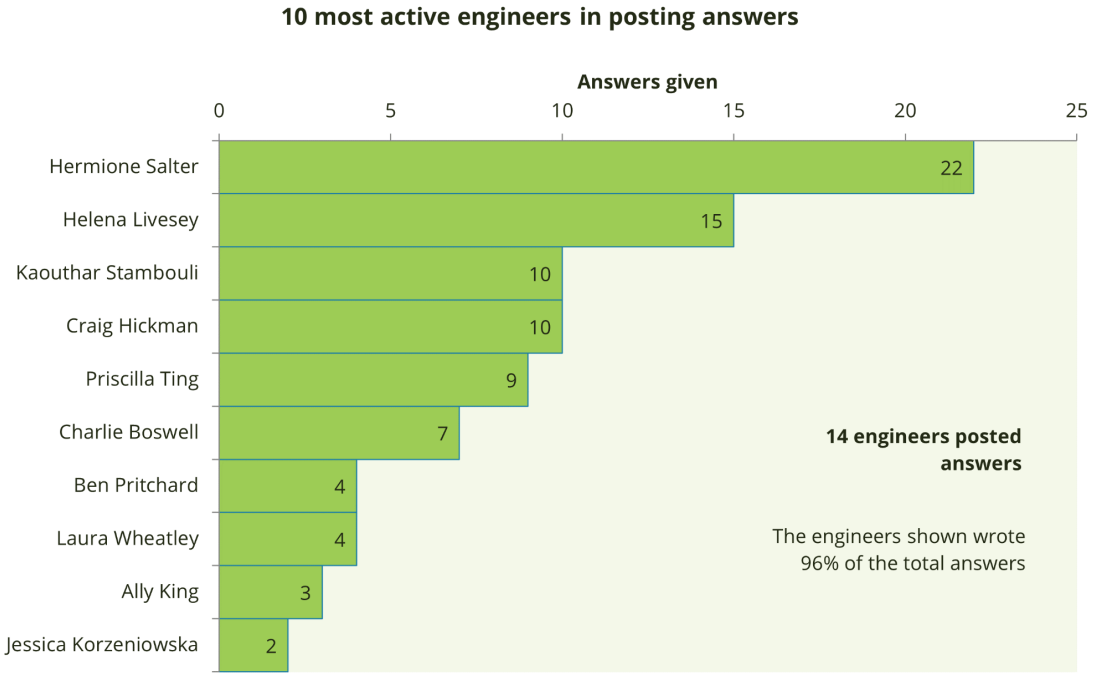
Engineer activity

During the Zone the engineers interacted with students by writing 1,065 lines of live chat, and providing 90 answers to 26 posted questions. On average, 3 engineers attended each live chat.





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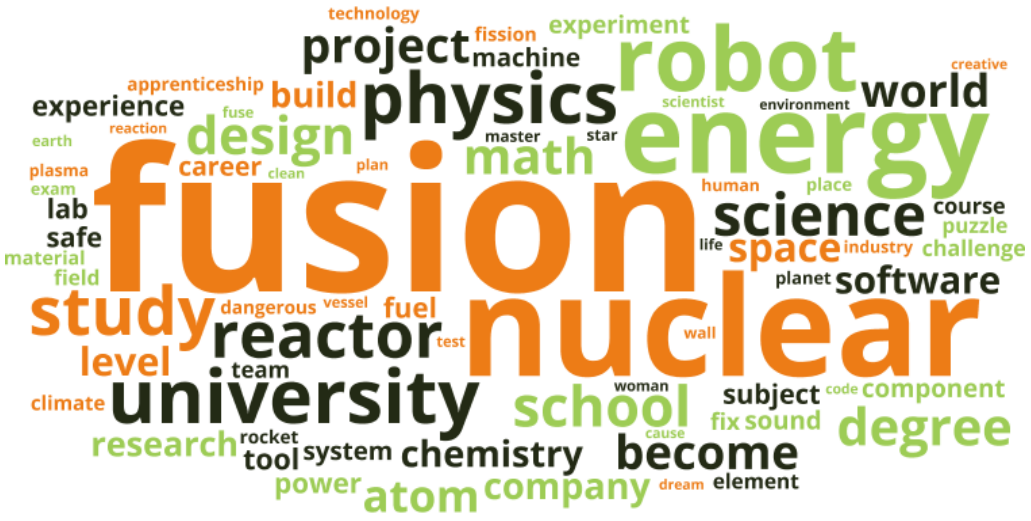
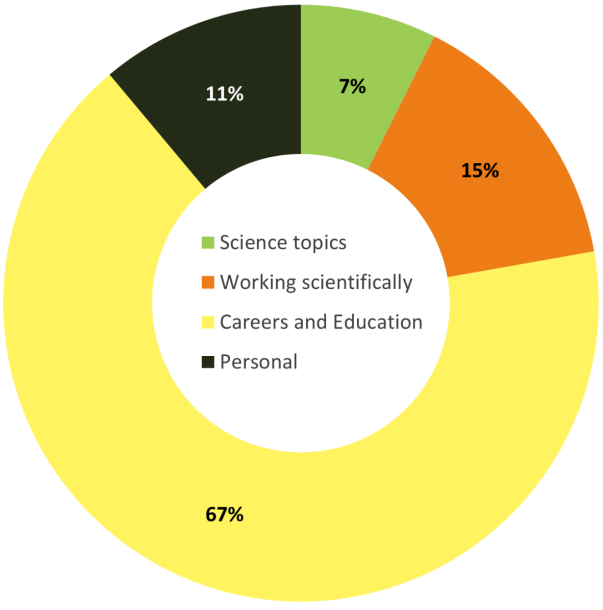
Live chats

The word cloud below demonstrates what students and engineers talked about in live chats. The bigger the word, the more frequently it was used.



Questions in Ask section

The chart below shows an analysis of questions students sent to the engineers. Questions are coded into overarching categories. The examples are coloured by category.



How was nuclear fusion discovered?

What are the dangers from nuclear fusion?

How did you know how to recreate the sun's nuclear fusion?

Would we be able to implement nuclear fusion quickly enough to reach global climate goals?

Did you ever get to go to space?

What does your job description include as a graduate mechanical engineer?

What kinds of drawbacks did you face whilst trying to succeed in this field?

What's your favourite pizza topping?

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Good engagement

Information on the scientists careers can provide insight into how variable careers can be and what students may need to do to get there.

Student 1: How did you get into nuclear engineering since there are no university courses on it?

***Priscilla (engineer)**: So I was initially very fond of the aero industry but they are probably the worst in terms of sustainability with the relatively low efficiency that goes through flywing a plane and so I did a sustainable energy course where they briefly introduced nuclear fusion and fission :) So that was how I got interested in nuclear fusion engineering!*

Student 1: Thank you, I was also interested in aeronautical

***Priscilla (engineer)**: I would say go for it! You are not limited to just the aero theory. From my experience, you learn different skill sets that can be applied in most other engineering sectors.*

Student 1: Was becoming an engineer harder for a woman?

***Ally (engineer)**: Sometimes as a woman you find yourself working in teams of all men, which can be difficult! But I've met many inspiring women engineers in my job who have done great things!*

***Priscilla (engineer)**: I would say there are challenges as it is still seen as a male dominant career. BUt the world is evolving and I think us women have to be ready to step up. I have been in teams where I'm the only female (in fact I am still the only female in my small team) and it may be intimidating to someone but as long as you know your stuff and are confident enough, you'll get through alright!*

Subject specific questions can help generate interest and knowledge about the scientific field.

Student 1: What is nuclear fusion?

> ***Hermione (engineer)****: Nuclear fusion is where the nuclei of 2 different atoms (the bit in the centre of the atom) join together to make a new atom. This produces lots of energy that we can use to make electricity.*

> **Student 1:** Wow that's amazing!

Student 1: How close would you say you are to figuring out nuclear fusion? Do you think it could solve climate change?

> ***Priscilla (engineer)****: I say we are still at quite the beginning. We know the theory but in practice it might be different. That is why we are only at the early stages of researching it to be commercially available.*
>
> *It would "help" climate change as this is new clean energy but everyone has to do their parts. People have to stop polluting the earth etc. so it alone might not be able to solve climate change. At least that is my opinion!*

Being able to see how science is relevant to everyday life and how certain knowledge or science can be utilised is an important part of Science Capital.

Student 1: Why do you do what you do?

> ***Craig (engineer)****: Good question. I wanted to leave the world in a better place I found it. Engineering is a way to invent things that help humanity. The robots I work on help make Fusion Energy possible, and I strongly believe that Fusion will help save the world.*

Connecting with scientists over shared interest and learning that they are “regular people” can help students relate to them. This makes it easier for students to see themselves in science-related careers.

Student1: What is your favourite musical?

***Jessica (engineer)**: Oh goodness. I have too many favourites. At the minute Anything Goes (tap dancing sailors - it's going to be on BBC on Boxing Day FYI) but all time favourites probably Funny Girl (an older one with Barbara Streisand) and also Les Miserables*

Student 1: Those sound awesome.

Student 2: I love Funny Girl

***Jessica (engineer)**: YAASSS oh such good taste! My dream role would be Fanny Bride*

Student 1: Have you had any scary moments while doing science?

***Jessica (engineer)**: Yes! When I was studying A-level chemistry at school, we were working with very poisonous acids. I accidentally let a drip of acid slide down the outside of all my complicated glass equipment. The acod burnt through the plastic clip holding all my equipment together and one of my clasps smashed to the floor!*

Student 1: Oh no! What did the science teacher say?

***Jessica (engineer)**: She pulled a very grumpy face and sort of went ‘Well, I did tell you!’*

Engineers of the Week

Students voted each week for their favourite engineer to be named Engineer of the Week.

The Engineers of the Week were:

Toby James, Graduate Software Engineer at Culham Centre for Fusion Energy

Hermione Salter, Graduate Physicist at United Kingdom Atomic Energy Authority

Laura Wheatley, PhD student at University of Oxford

Engineer Winner

The overall winner, with the most votes at the end of the Zone was:

- **Jessica Korzeniowska**, Systems Engineer and DEMO Requirements Manager at UK Atomic Energy Authority

As Zone winner, they receive £500 to spend on further public outreach projects.

"Taking part has been so enjoyable for me and made me remember just how much I love engineering. I hope you know that you inspire all of us taking part too as much as we hope to inspire and encourage you! Hearing your enthusiasm and excitement when we explain things about our jobs, reminds us that things we do are cool and exciting, even if they are sometimes challenging."

You can read their full statement at
https://fusion21.imanengineer.org.uk/2021/12/22/a-thank-you-from-your-winner-jessica/

Feedback

Thank you all for letting me and my classmates join this chat. It was very fun and interesting. I hope we do it again.

Student

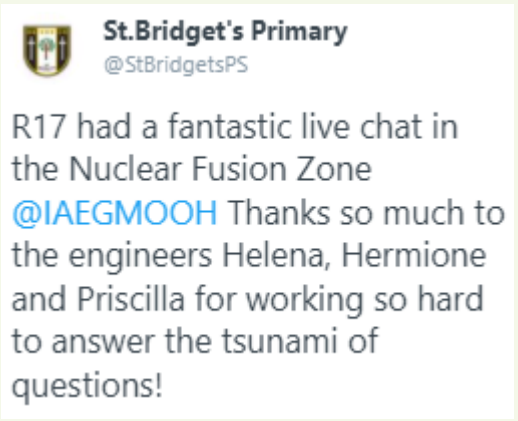
I've really enjoyed all the Q and As that have run so far, and would happily keep going.

Thank you for putting it all together

Charlie (Engineer)

Taking part has been so enjoyable for me and made me remember just how much I love engineering.

Jessica (Engineer)



Thank you very much. It was great to be able to ask you all questions and get some great answers :)

Student

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