I'm a Scientist,
Stay at home

April–June 2020

Activity, evaluation, and lessons learned

August 2020

Contents

About *I'm a Scientist*

I'm a Scientist, Get me out of here **(IAS, imascientist.org.uk) is an online, student-led, public engagement project that supports science capital by giving school students across the UK real interactions with scientists and other STEM professionals.**

Scientists create profiles on the website and engage directly with school students through answering posted questions, and in real-time, text-based chats. Students ask questions about whatever they want; questions about careers, research, as well as their wider interests and lives outside of work.

Through taking part, students engage with STEM professionals from a diverse range of backgrounds, disciplines, and industries. They get to see scientists as ordinary people with hobbies, interests, pets, and families. They learn about STEM careers and opportunities in higher education, while seeing how what they learn in school relates to the world around them.

In 2020 UK Research and Innovation (UKRI, ukri.org) and 10 other organisations provided funding to run IAS during COVID-19 related school closures. This report is a summary of the activity in, lessons learnt, and an evaluation of the impact of this event.

Executive summary

Planning

I'm a Scientist, Stay at home was planned in a short four week period of turmoil and uncertainty from late-March to mid-April 2020.

Our capacity modelling was based on 5% of UK schools requesting space in the activity. This seemed reasonable based on promotional support and our unique position of being able to provide online STEM enrichment at scale. This would involve up to 150,000 students connecting with 1,800 scientists

Recruitment

Interest levels were excellent. By the end of the first day of school activity we had over 1,000 scientists and engineers signed up. By the end of the summer term we had 2,450 applied to take part.

Interest from secondary school teachers was strong too. Teachers from 12% of UK secondary schools signed up to take part with their students.

However interest from primary schools was weak. Only 1% of primary schools signed up. As the demands placed on primary schools became clear — children of key workers; return of EYFS, Y1 and Y6 after half term; and uncertainty over it all — it wasn't altogether surprising.

Converting interest into activity also proved to be a challenge. Out of the 1,068 teachers signed up, only 262 had students participate. 190 schools in total.

The intention and interest from secondary schools was significantly higher than expected, but conflicting pressures prevented that intention from converting into action.

We created capacity for 100,000 students but in the end only 6,945 students created accounts.

Teachers faced challenges:

- Increased workload to provide centre assessed grades
- adapting to remote teaching
- providing childcare for their own children
- student compliance with teaching instructions
- Equity issues resulting from access to IT for students at home

Some schools ran video lessons, some maintained a timetable, some set occasional work. STEM enrichment mostly became a voluntary activity rather than a lesson.

For those who did participate the experience was excellent.

The student to scientist ratio in chats at around 1:1 was better than normal (6:1 in November 2019). This led to more in-depth conversations, to greater satisfaction from students who got their questions answered and from scientists who felt less pressured and committed.

Interviews with teachers and analysis of live chat transcripts allowed us to build on previous research. It provides confidence that the activity continues to support students' science capital. They continue to build rapport with scientists, to understand the variety in STEM and to see science as something for them.

We also heard from teachers that it provided a rare chance for them to connect with their classes.

There were considerable benefits for the scientists too. For one self-isolating scientist it felt like a lifeline. For others it helped motivate them through a difficult, isolated time. For most it was the main or only outreach activity they were able to do during the summer term. Researchers have been encouraged to make public engagement a key part of their work. We are glad we were able to help them maintain their commitment.

Legacy

The *I'm a Scientist, Stay at home* programme isn't finished. There is a legacy to funding provided and the work done so far with it.

In September 2020 we launched *I'm a Scientist: On Demand*. It is available for teachers to run STEM enrichment at a time that suits them. The investment we made in *I'm a Scientist, Stay at home* made this service to teachers possible.

We continue to build on the development we did since April. The student registration process has been improved. Our back-end system changes allow us to operate with large numbers of teachers and scientists efficiently. Dynamic lists of scientists so students can focus on the people they are engaging with are live. The chat calendar has been improved again, to allow teachers to make requests for certain types of STEM professionals.

We are currently running shorter 4 week zones to make the commitment more manageable for scientists. We are bringing back the cash prize to increase the involvement and agency for the students.

Summary of learning

What worked well

Act swiftly

- The education sector was upturned almost overnight in March 2020. The online IAS project was already in a good place to help schools, but it was still important for us to move quickly to test our assumptions, systems, and processes in time to launch to teachers before the Summer term started 4 weeks later.
- Mangorolla has always operated partially remotely, with the option for people to work from home. We didn't experience any downtime. The organisation is resilient.

Remote access for students

- Our format has always had an online-only option. However it was designed to operate in a school classroom.
- We needed to improve our systems to allow students to easily register remotely. This worked well.
- Less effective, and outside our control, was getting students to login when instructed. Student compliance was an issue for schools.

Teacher reporting

- With students and teachers separated we needed to improve the monitoring systems so teachers knew which students had registered and participated.
- Our system functioned well and 85% of teachers reported satisfaction with it. It worked well but we recognised the need to explain it better, and to improve it to include, for example, voting activity.

Flexibility and Capacity

- In unpredictable times teachers were grateful for the ability to book live chats sessions at late notice. This was made possible by the technical changes we made, but also the increase in number of scientists per zone.
- This led to a change in the scientist:student ratio to parity in live chats greatly improving the experience for students.
- We don't expect the ratio to remain at parity but we are continuing to run longer, larger capacity zones to maintain flexibility for teachers and to keep the number of scientists per chat as high as is feasible.

What didn't work as well

Promotion

- Although over 1,000 teachers registered an interest in participating in the activity, most came very early in the process. As the school lockdown continued it became increasingly difficult to get a response from teachers via email. Promotion fatigue seemed to be experienced by a few projects.
- That trend has continued through Autumn 2020.

Conversion rates

- Initial interest from teachers and schools was good. Converting that interest into activity was more challenging.
- We simplified our processes during lockdown and work continues to streamline onboarding.
- Trying to get teachers to do new things while the whole teaching environment is new is understandably hard.
- Our future plans include building relationships with schools rather than just individual teachers by providing monitoring tools and simpler whole school sign up processes.

Forecasting

- Our model for forecasting numbers was too simplistic in March/April 2020.
    - Allowing for 5% of both primary and secondary schools to participate was wrong. Our stronger base in secondary schools would always favour them.
    - We didn't appreciate the differing pressures on primary and secondary schools. Primaries had more students in schools and being kept outside where possible. Their communication systems to homes were less developed and more pupils didn't have access to IT at home.
    - We should have downgraded our expectations on primary schools.
- We allowed for large class sizes in our model.
    - The actual numbers of students participating in chats was lower than normal. Student compliance was varied. We were over-optimistic.

I'm a Scientist, Stay at home was planned and run under extreme pressure, at great speed in novel and trying circumstances. In places our optimism on numbers was misplaced. Our expectations around benefits for students and scientists however, was not. The activity allowed STEM enrichment to continue providing inspiration for students and opportunities for scientists and engineers to engage when no other options were available.

Background

Purpose of document

The weeks and months since the impact of Coronavirus became clear have been extremely intense and the *I'm a Scientist* team have worked exceedingly hard under challenging conditions to deliver as much STEM enrichment as possible.

This document is intended to record that work, the outputs, the outcomes and to reflect on the successes and failures experienced.

We do this to demonstrate to funders the value of their investment in us and our programme.

We do this to learn.

Covid-19 is with us for some time. School closures will happen again; national, local or partial. We don't know for sure, but school-life is not going back to normal anytime soon. We need to learn from *IAS Stay at home* to deliver better engagement in the autumn of 2020 and beyond.

Throughout this report we refer to science and scientists. We also ran an I'm an Engineer and an I'm a Mathematician zone. Where we refer to scientists we also include engineers and mathematicians.

Expected impact of school closures

In early March 2020 it became increasingly clear that Coronavirus was going to have a significant impact on the UK and that schools were going to be closed for a long period.

IAS is an online, student-led STEM enrichment activity. It connects school students with scientists through energetic real time text based chats. We have had previous experience in running the project during the 'Beast from the East' school closures in March 2019.

From our own research[1] and from other people's experience we know the value that teachers place on STEM enrichment and getting their students meeting scientists. We wanted to be ready to support teachers with STEM enrichment activity during lockdown.

[1] https://about.imascientist.org.uk/student-impact/

Green Zone Pilot

IAS has long had the capability to be run entirely online, but we knew that to accommodate large numbers of new teachers we needed to improve our systems.

We also knew that despite having run online engagement projects for 17 years, we were entering into new territory with an extended period of school closures.

We decided to launch a Zone to be ready for the first day of national school closure so that we could test our systems, and to help us understand any new dynamics of the event with teachers and students both being at home.

The Green Zone ran from March 23rd to April 3rd. Our evaluation is published.[2]

Plans for *I'm a Scientist, Stay at home*

The feedback from teachers in the Green Zone was positive. We decided to expand our capacity for the Summer Term. The report covers data and analysis for the schools zones. The analysis excludes the open to the public Summer Zone.

We modelled the capacity requirements on reaching 5% of schools in the UK.

Research and modelling of capacity requirements

In order to budget for meeting demand from schools we created a model of capacity requirements based on a percentage of schools wanting to take part. We would ramp up capacity every fortnight to smooth the workload until capacity matched demand. In order to model the capacity that might be required, our assumptions allowed for high levels of engagement from the schools that signed up. This was necessary because the consequences of offering an activity to schools, and then not being able to deliver would have been very negative.

Take up	5%	10%	20%	30%
Primary Zones	9	18	36	55
Secondary Zones	6	12	25	37
Zones	15	30	61	92
Scientists	1080	2160	4392	6624

[2] https://about.imascientist.org.uk/2020/im-a-scientist-get-me-out-of-here-green-zone-evaluation-report/

Schools	1272	2016	5120	7784
Classes	7200	14400	29280	44160
Students	144000	288000	585600	883200
Chats concurrent	60	120	244	368

This modelling work was done between 23rd March and 14th April. We were in an unprecedented and unpredictable situation. There was no available data about school plans, or length of closure.

Our approach was to provide a range of scenarios to demonstrate the capacity we would require based on a percentage of schools taking up an offer to participate in the activity.

Our assumptions were as follows (some numbers are rounded for convenience):

No. of secondary schools in UK	4,000
No. of primary schools	22,000
Average no. of participating classes per secondary school	15
Average no. of participating classes per primary school	4
Average no. of students per class	25
Maximum no. of chats per day per zone	24
Maximum no. of chats per month per zone	480
No. of scientists required per zone	160

Based on these assumptions, if 5% of schools took up our offer we would need to provide capacity for:

Primary schools	1,100
Primary Classes	4,400
Secondary schools	200
Secondary classes	3,000
Scientists	1,080
Primary Zones (rounded down)	9
Secondary Zones (rounded down)	6

Bearing in mind that the modelling was done before schools 'reopened' after the easter break, it was impossible to test the assumptions beyond our observations and feedback from the Green Zone pilot.

The model was designed to show the capacity we might need to provide. It assumed the demand would be evenly distributed across zone themes and time.

As will be discussed later in the report, our assumptions underestimated the number of secondary schools that would sign up. However they also over estimated the number of classes per school, the number of students per class, and the number of primary schools that would sign up.

I'm a Scientist, Stay at home

Timeline

The first zones opened on 20 April, with additional zones opening later in the term as more funding was confirmed.

3 April	**SAH announced**
20 April	**First zones launched and live chats opened** Medical Research, Psychology
27 April	**Second set of zones launched** Physics, Disease Detectives, Environment
11 May	**Third set of zones launched** Tomorrow's Engineers
21 May	**Fourth and final set of zones launched** Circle (General Maths), Coding, Food, Summer
17 July	**End of the main activity, final live chats** Summer Zone remains open
30 July	**Summer Zone ends**

Zones

Chemistry Zone	*Funded by Johnson Matthey PLC*
Coding Zone	*Funded by bp PLC*
Disease Detectives Zone	*Funded by Wellcome Genome Campus*
Environment Zone	*Funded by Royal Society of Chemistry*
Food Zone	*Solely funded by core UKRI funding*
Medical Research Zone	*Funded by Medical Research Council*
Physics Zone	*Funded by Ogden Trust*
Psychology Zone	*Funded by British Psychological Society*
Summer 2020 Zone[3]	*Solely funded by core UKRI funding*
Tomorrow's Engineers Zone ***(I'm an Engineer)***	*Funded by Tomorrow's Engineers*
Circle Zone ***(I'm a Mathematician)***	*Solely funded by core UKRI funding*

[3] The Summer Zone was an open zone; members of the public could register through social media to ask questions or join open live chats.

Aims, objectives, outputs

Aims

- To support students' science capital and thereby increase the likelihood they would see science as something for them.
- To help teachers keep connected with their students during school closures

Objectives

- Provide capacity for 5% of UK schools
    - 1,000 teachers
- Provide capacity for over 1,800 scientists
- Host 2,500 live chats
- Engage 50,000 students

Outputs

- Create 15 zones
- Promotion to teachers via:
    - IAS Lists
    - 3rd party networks
- Promotion to scientists
    - IAS lists
    - 3rd party networks
    - Social Media

Schools, teachers, students

School registrations

Summary

We promoted the *I'm a Scientist, Stay at home* activity widely through our own lists, through funders, through 3rd parties, and on social media. We report on the effectiveness of those routes in section 8.

Teachers from 798 schools registered to take part. 190 schools actively participated.

Secondary schools were well represented. 12% of UK secondary schools signed up. A quarter of them actually participated. Primary schools both signed up in lower proportions and converted to participation at lower levels again.

Compared to our normal schools activity, we saw higher levels of independent schools and lower levels of WP schools participating.

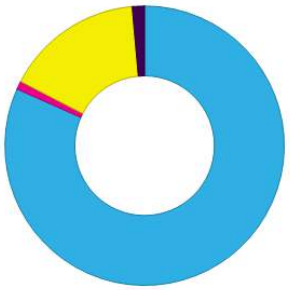
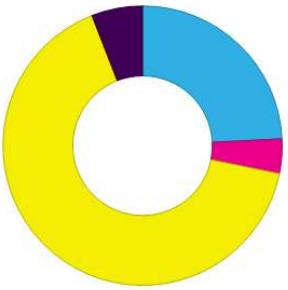
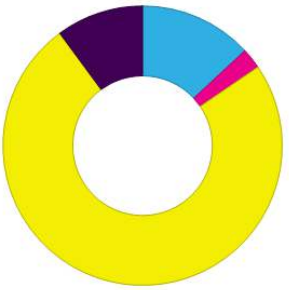
School sign ups were fairly strong at the launch as we'd normally expect. They remained strong through to the half-term break. After half-term sign ups dropped off.

The evidence we have gathered explains the pattern of sign-ups:

- Our own lists are historically biased towards secondary schools.
- Primary schools seemed even less well-prepared for school closures.
    - Communication systems between school and home were basic
        - Little use of VLE's
        - Lower levels of IT access for younger children
    - Emphasis was more on home schooling rather than remote learning
    - Primary schools more likely to be open for children of key workers
    - Primary schools were told to reopen for EYFS, Y1 and Y6 before secondary schools causing more disruption
- The capacity we created meant all schools were welcome. Independent schools have more resources to organise enrichment activity.
- WP schools in economically deprived areas were more likely to have pupils unable to access IT at home. They were more likely to opt out of digital tools in favour of distributing paper based work for pupils at home.
- Interest was strong at the beginning. As the closures went on we heard more stories of teachers experiencing offer fatigue - too many suggestions of activities to run.

School data

School phase

	Total in UK	Signed up to SAH	Participated in SAH
			
	Number / % of total	*Number / % of total signed up / % of total UK*	*Number / % of signed up*
Primary	19,749 / 82%	164 / 23% / 1%	22 / 12%
Mixed	231 / 1%	27 / 4% / 12%	4 / 15%
Secondary	3,864 / 16%	446 / 64% / 12%	125 / 28%
16 Plus	344 / 1%	40 / 6% / 12%	17 / 43%

Above: *Number of UK schools, and sign up and participation by school phase. Numbers exclude independent and overseas schools*

School location

Schools from across the whole of the UK registered to take part. The map shows registered schools (blue) and active schools (yellow).

Schools in England and Wales were better represented. This would have been due in part to Scottish and Northern Irish schools finishing in June.

	Primary	Secondary
	Number signed up / % of schools in nation[4]	
England and Wales	147 / 1%	405 / 12%
Scotland	17 / 1%	32 / 9%
NI	-	9 / 7%
Overseas		18

Widening participation and underserved schools

	Signed up	Participated
	Number / % of signed up school in this category	
Widening participation (WP)	182 / 26%	43 / 23%
Underserved by distance (U)	258 / 37%	78 / 41%

A widening participation (WP) school has an above average number of pupils eligible for free school meals. In Scotland it is a school where more than 20% of pupils live in the 20% most deprived data zones.[5]

37% of secondary schools in the UK fall into this category.

[4] Numbers for state maintained schools
[5] https://about.imascientist.org.uk/under-served-and-wp/

WP schools were underrepresented in Stay at home compared to the national rates and our previous provision of activity.

Similarly underserved (U) schools are more likely to be in areas of perceived poor internet accessibility. Some schools reported that they had avoided remote learning because of poor internet access for students.

School type

	Signed up	Participated
State schools	642	153
Independent schools	86	16
Special schools	7	-
Colleges	35	15
Alternative provision	3	-
International schools	18	4
Other	7	2

Sign ups from independent schools were higher than normal. They have more resources to request enrichment activities. We normally suppress demand from independent schools by charging them to participate, however in Stay at home we provided access for free as we had capacity.

Previous experience in IAS

67% of schools which signed up had not previously taken part in I'm a... activities.

Schools with previous experience of IAS however were more likely to actively engage in the SAH activity, with this figure dropping to 40% for actively engaged schools.

Number of schools which had not participated in previous I'm a... activities	
Signed up	**Actively participated**
Number / Proportion of total	
540 / 67%	75 / 40%

Teachers

Overall numbers

1,068 teachers registered. 48% of schools had more than one teacher register. Actively participating schools were more likely to have more teachers. We saw examples where one teacher would see the opportunity and spread the word around the teachers in their department.

In total, 262 teachers had students who created accounts on the site and actively engaged in live chats, posted questions or comments, or cast a vote.

806 teachers were inactive, 109 of these however taught at a school which did actively participate.

School case study: **Chatsmore High School**

PC, science teacher at Chatsmore High School, signed up in early April along with a colleague DK.

They booked chats and a further four teachers registered in the first week of term. The chats were successful and a further three teachers signed up in May and June.

In total the appropriately named school booked a total of 25 live chats.

Subjects taught

When signing up teachers were asked which subject(s) they taught. The majority selected “General science”, with no real bias toward any of the three main sciences.

Non participation

Feedback on the current teaching situation from teachers and third party networks, and school policies on remote teaching.

Due to the COVID-19 disruptions, fewer teachers who signed up took part in the event than was expected. 75% of those who registered for the activity did not book a live chat. We asked non-participating teachers for their feedback.

School case study:
Unsupportive SLT

Some schools found themselves underprepared for remote learning. One teacher who had previously participated in *I'm a Scientist* signed up the entire Year 7 cohort for chats. Shortly after booking they cancelled all 8 of them.

Apparently the teacher's line manager had said they needed SLT approval to take part. The response from the SLT was that they were still assessing online platforms. This was ten weeks after schools had closed.

Barriers to participation

Teacher workload

Teachers who had not engaged, or who only engaged in a single live chat were contacted to offer support, or to find out what barriers may exist preventing them from engaging further.

28% of teachers who responded to the non-participation survey said they had been too busy to fit in a live chat. Many told us the sudden change to online learning and centre assessed exam grading had hugely increased their workload and that extra-curricular activities were not a priority.

> *To say I am up to my eyeballs in work is an understatement. Between creating and marking work on Teams, chasing non-engagers, volunteering in Hubs and trying to sort out going back to school, I have not had the time. In Scotland we have 3 weeks of school left and are to go back in August, but we still have not been told how that will work, how it will be staffed, how we have to adapt our resources to fit the new normal etc. So it is not a case of anything on your part, it is we are all up to our eyes in work and stress.* ***— Teacher new to IAS activities, no chats booked***

Other teachers — both those new to IAS activities, and teachers who have been taking part for years — shared similar sentiments.

Student behaviour

Additionally, one teacher was concerned about students' online behaviour when teaching remotely:

> *I think there are also concerns from the teachers about behaviour online: whether pupils will log in with appropriate details, and we won't be able to moderate the pupils as we usually would in the classroom. I know you moderate the chats very well at your end, but I think the teachers feel a responsibility to be able to control behaviour at our end. The large number of scientists in each zone means we can't do our usual prep and question planning for specific scientists, but I think it could still work, especially if maybe each scientist gives a quick intro during the chat? —* ***Experienced teacher, no chats booked***

In response to similar concerns about moderation, new features were added to the site allowing for greater teacher control[6].

Access to IT

Another teacher highlighted uncertainty about timetables, combined with new safety measures meaning that students would not be able to access computers in school:

> *It was also dependent on when we were reopening to the wider school. Most of my pupils who logged in might be in school and unfortunately due to safety measures would not be allowed access to laptops. So I am just waiting to make sure that they will be home on the date I book. —* ***New teacher, one chat booked***

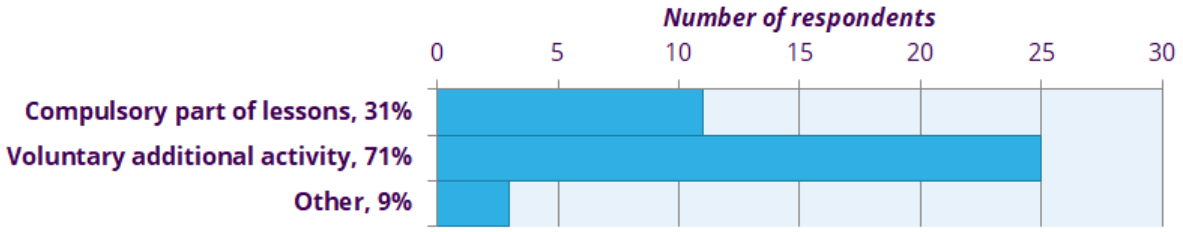
We also saw a big increase in students using mobile devices to access the website - 23.23% compared to 8.9% in November 2019. The chat rooms are easier to use on a laptop or tablet than a mobile, which could also have contributed to the lower number of active students. Teachers told us this was another barrier to taking part:

> *We are trying to keep remote learning as simple and access-friendly as possible as a large number of our students do not have easy access to laptops/tablets as they are having to share the resources that they do have amongst their family members.*
>
> *I am conscious of the fact that this could be a great opportunity but we have to be careful not to offer tasks that rely on computers and internet connection as surprisingly large numbers of our pupils don't have this at home, many because they are sharing devices with siblings and parents who are currently also working at home.*

[6] See also: *Development work; Site; Live chat engine*

Student compliance

School closure affected student participation. 71% of teachers made the activity optional.



Above: *Post-event teacher survey: How did you present the activity to your students (respondents could select more than one option)*

> *Currently we don't require students to do Science at a set time at home so it is difficult to ensure most of the class can tune in at the same time. We may use it when we have some students back in school if times are appropriate. It's a great idea thank you for offering.*

Even among those who required participation we often saw less than 50% compliance from students. Additionally, participation from home meant that students did not receive the same levels of encouragement from their teachers, nor experienced the normalising effect of seeing their classmates participate next to them. This meant we saw an average of 14 students per class actively participate compared to 20 in a normal school based event[7].

Feedback from teachers showed they had difficulties engaging all of their class with the activity:

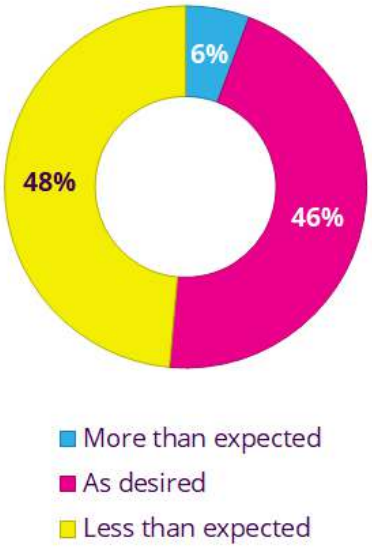
> *[It was] difficult to get students on board as I can only contact them online.*

Other teachers commented that their students may lack the confidence to ask questions; while in the classroom the teacher can encourage and persuade them to engage, but this becomes much more difficult when teaching remotely.

[7] IAS November 2019

As part of the post-event survey, teachers were also asked to report on whether the number of participating students was as expected.

49% (17/35) of teachers reported seeing fewer students than expected. When asked why they thought the number of participating students differed from their expectations:



> *Students have been overwhelmed by the remote learning and was really difficult to motivate them to try something extra*
>
> *I invited whole year groups but the uptake was very limited. I couldn't get the engagement levels remotely.*
>
> *Had been in lockdown for some time so many students took on extra hours at work eg in supermarkets*
>
> *Lack of availability of equipment at home or time and space. Lack of understanding from parents of how to support students to engage*
>
> *Had problems setting up accounts that couldn't be resolved remotely, forgot they had chats booked in due to lack of routine, no motivation as couldn't hear from their friends if they were taking part or not.*

A number of teachers commented on the difficulty of remote communications, with either students or teachers not reading emails or checking the school website.

Other teachers reported some difficulties with the site, where students had struggled to log in, or struggled when moving between different zones.

The feedback has shown the importance of the role of teachers in our activity, and the challenges of online learning.

School participation

There was significant variation in how schools used the activity. Some involved a single teacher booking one or two chats. Others like Chatsmore[8] saw increasing numbers of teachers and 25 chats being booked in total.

28% of schools booked a single live chat, 24% booked 2, and 49% booked 3 or more chats.

8% of schools booked 10 or more chats, with 1 school — Chatsmore — booking 25.

The average class size in IAS when participating in school is 20 students[9]. With students at home the majority of schools didn't manage to match that. Teachers and schools had the intention of participating but often the unexpected and unpredictable reality of school closures got in the way.

[8] See also: School case study in *Schools, teachers, students; School registrations; Teachers*
[9] IAS November 2019

Student activity

Activity figures

Overview

	Zone average	Total
Schools	32	190
Students logged in	682	6,945
Active users	491	4,352
% of students active	57%	62%
Students who asked a question	74	698
Questions asked	178	1,776
Questions approved	151	1,506
Comments from students	18	182
Votes	350	3,503
Students active in live chats	440	3,897
Lines of live chat from students	5,474	54,739
Live chats	55	547

Activity from students at widening participation and underserved schools

% of total activity from students at widening participation (WP) or underserved (U) schools (average for zones)[10]		
	WP	U
Active users	18%	45%
Lines of chat	22%	43%
Questions approved	19%	44%

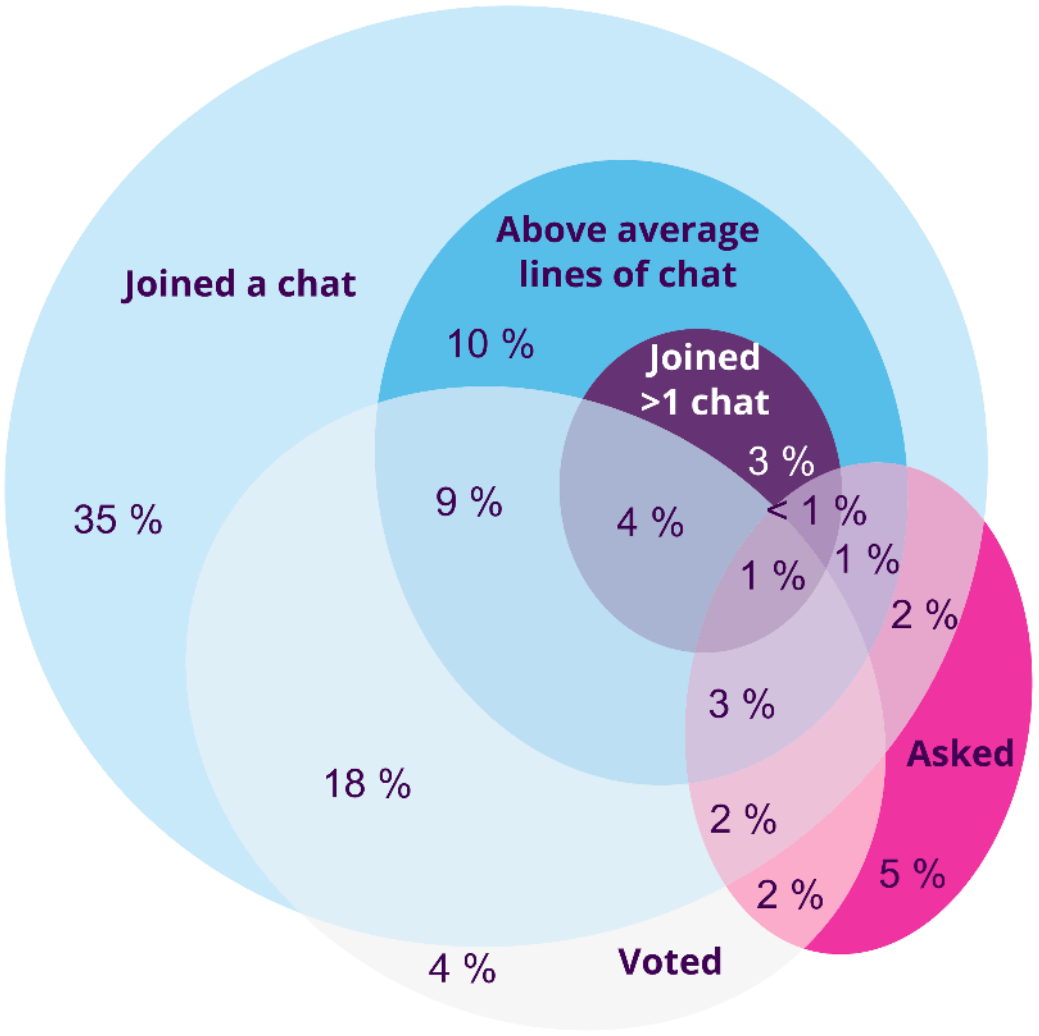
[10] For more information on WP and U schools, see also: *Schools, teachers, students; School registrations; School data*

How students engaged

The diagram shows the activity of students who actively participated, and how they engaged.

Student activity in *Stay at home* was, as usual, very focussed on chats. A typical student (89%) took part in one live chat, wrote 14 lines of chats.

However, fewer than expected students took part in more than one chat. Our modelling assumption allowed for students to take part once a month. Despite the positive feedback we received from teachers, they didn't follow our model.



*Total joined a chat, **89%**; Total above average lines of chat, **32%**; Total joined >1 chat, **9%**; Total asked, **17%**; Total voted, **43%***

Live chats

Over the course of the event, students took part in 774 live chats, writing 52,706 lines of chat comprising 463,910 words (that's about the length of *The Lord of the Rings* trilogy).

774

Live chats

The word cloud shows common words used by students in chats (size is proportional to frequency, colour has no meaning).

Phrases such as "covid", "coronavirus", "vaccine", "disease", "virus" all feature, though are no more dominant than other topics which would appear in regular IAS events: Questions about other science topics, the scientists' work, their lives outside work, career advice, or their motivations to get into STEM.[11]

52,706

Lines of live chat written by students

463,910

Words written in live chats by students

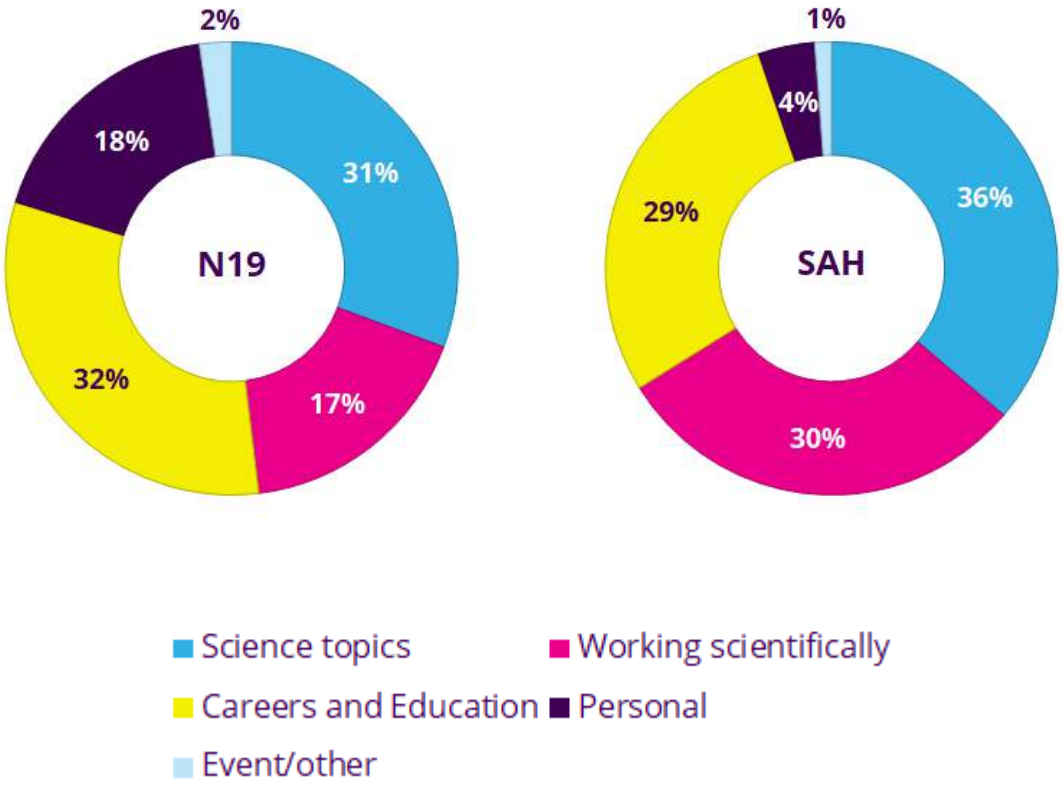
[11] For more detailed discussion of live chat conversation topics, see also: *Schools, teachers, students; Experience of activity*

Posted questions in 'Ask'

Fewer students (17%) than normal asked questions in the Ask section. Feedback suggests that might be due to the higher than normal ratio of scientists to students. In chats students got more of their questions answered.

The majority only asked one question, but as per normal there were nearly 100 students who asked more than 3 questions.

Topics in posted questions



Posted questions were coded for topics, when compared with the IAS November 2019 (N19) activity, we see that SAH saw a greater proportion of questions around the topic of working scientifically, and fewer questions about the scientists lives outside of work.

We expect that is because personal and career questions got addressed in live chats whereas some of the more keen students who went on to ask questions were more interested than usual in the scientists' work and research.

Voting

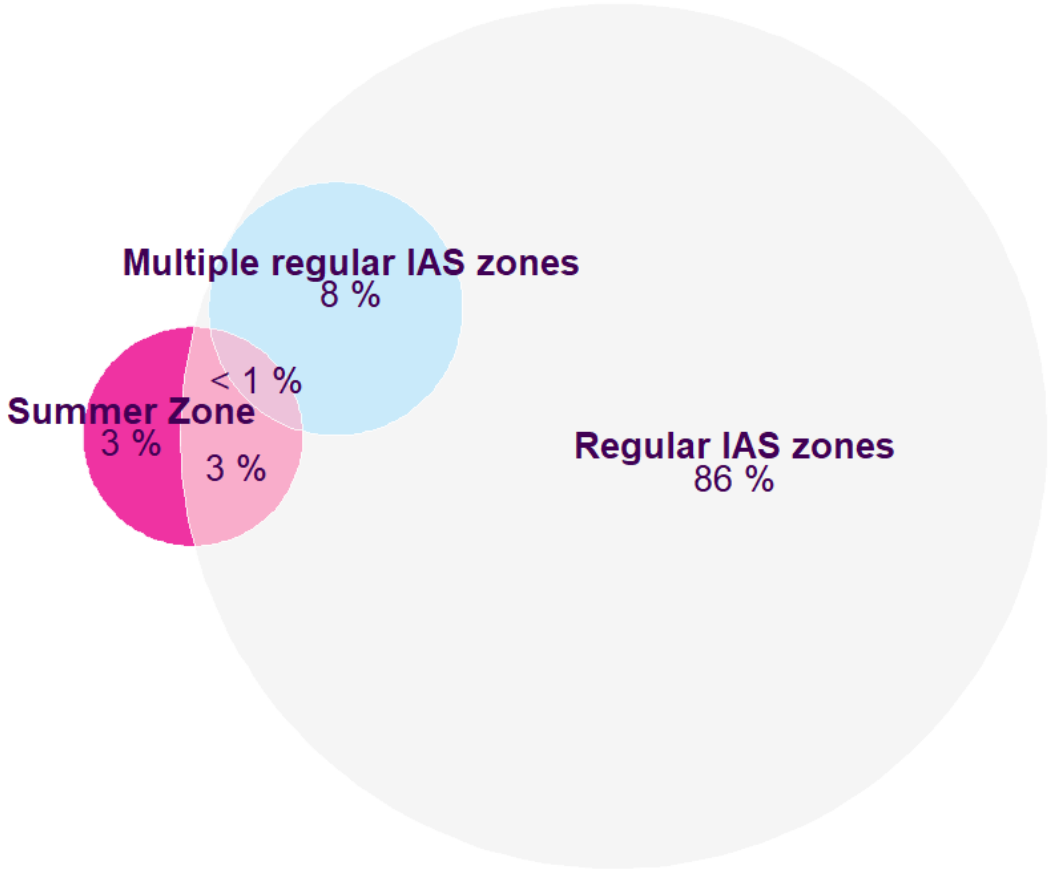
Far fewer students voted, 43% compared with 83% in a school based zone[12]. This is probably due to two factors. Firstly there was no cash prize for the winning scientist. Secondly, the vote page contained over 100 scientists in most zones making it hard to find the scientist you wanted to vote for.

Activity across multiple zones

While the original intention was for students to remain and take part in a single zone, following requests from teachers, students were able to move to additional zones.

The diagram shows active students proportionate to the number of zones in which they were active.

The majority of students (89%) took part in only a single zone (including those who took part in only the Summer Zone).



[12] IAS November 2019

Experience of activity

Summary

Insight into the nature and quality of the student experience in SAH comes primarily from the teachers and analysis of chat data. It was not possible to gather feedback from students directly due to the pandemic and related concerns around consent and privacy.

As part of the evaluation we interviewed 11 teachers by telephone. They had organised chats for pupils in years 6 through 13. Eight of their schools are typically underserved by science outreach (U) and two are widening participation (WP) schools. A further 35 teachers completed online surveys about their and their students' experience of SAH. More feedback was collated from emails and comments made during the chats. Finally, analysis of ten live chats explored the potential impact on the students more deeply.

The data collected provides very strong evidence that participating pupils had a high-quality experience in SAH.

Chat data came from 10 state schools, 8 of which were U and 2 were WP. Participants in the chats included pupils from years 6 (1 chat), 7 (2 chats), 8 (3 chats), 9 (1 chat), 10 (2 chats) and 12 (1 chat). The chat transcripts were analysed by first threading the interactions (or juxtaposing responses to questions and answers). Next, each thread was coded as a 'conversation' or not. An interaction counted as a conversation if it extended to at least four lines, or 'turns' (e.g. student question, scientist response, student response, scientist further response). Many conversations were substantially longer, with a few running to over 50 lines.

The focus of each conversation was described. These were then grouped into overarching categories (e.g. science topic, science process, educational/career path, personal life). In addition, each conversation was coded as indicative of rapport between the students and scientists or not. Indicators of rapport in an interaction included the tone (whether it flowed like a conversation between friends), the use of interjections or words such as 'interesting', 'wow' or 'really?', and the use of emojis. Rapport could also be indicated by the use of follow-up questions.

Finally, complete transcripts were reviewed. We tabulated scientist responses that echoed what our previous qualitative research with young people indicated contributed to positive impacts. These impacts included a sense of scientists being 'normal' or 'regular people' and a greater understanding of science careers and paths to them. The categories of responses we coded for included scientists:

- valuing or expressing interest in young people's questions
- referring to their personal lives (outside of work, or as children),
- displaying personality, approachability and/or a sense of humour,
- indicating that they are fallible (make mistakes, do not know everything);
- and discussing their educational and career paths and choices.

Conversation topics

Conversations between students and scientists took place in all of the chats and with 1 exception, the number of conversations ranged from 6 to 29 (and there were at least 10 conversations in 7 of the chats). The most prevalent focus of these chats by far was science.

Out of 129 conversations, 82 had a focus on science topics and 18 on associated science processes. Likewise, an analysis of questions students asked reflected a strong focus on science, with over half concerning science topics (33%), science processes (8%) or the context of science (16%). Although most conversations focused on science, most were far from formal, with scientists' and students' personalities often shining through, such as in this Year 7 chat in the Physics zone:

student @Ry: Do you think the universe is the big bang or the big bounce. if that makes scence

Ry @student: I hope it's a big bounce! But we need more observations to be certain! At the moment, it looks like the universe as it currently is isn't going to 'crunch' anytime soon :D but physics is strange, we need to do a lot more to be sure!

student @Ry: How are people going to make observtioons for ths?

Ry @student: We have to look at the red shift of galaxies as they expand away, this lets us determine the Hubble constant! At the minute it looks like we're expanding uniformly, however, scientists are beginning to question this!

student @Ry: Ohhhh I see thats really cool!

Ry @student: I know right! This was the piece of evidence Einstein needed to believe we were in an expanding universe

student @Ry: is there any other theories of the universe?

Ry @student: We have a few, M-brane theories and Multiverses, but all of these have zero evidence! It's very hard to prove what's happening beyond what we can measure !

student @Ry: Oh cool maybe one dat they may have evidence

Multiple conversations also focused on scientists' educational and career choices and paths. Students at times directly sought advice:

Student (Year 9): Which university is more respected: Aberystwyth or Cardiff? Or should I be thinking more about whether the courses and town/city is suited to me?

Azizc19 (teacher) @student: it depends on the course...different universities are known for being good for different subjects :)

Martin @student: i would focus on the curse and what that can offer you

student: @Martin: thanks

Martin @student: what course are you thinking about

student: @Martin: well I'm very indecisive because I'm unsure about if I'm taking humanities for A Level or sciences but it's either Welsh & History and perhaps a master's in something more specific OR anything Physics related courses

Freya @student: Have you thought about mixing sciences and humanities? I did a history A level and it was not just enjoyable, it was really useful for become a scientist (because it's all about assessing evidence)

student: @Freya: yes and the master's I was looking at paleography which I believe is classed as a scientist but obviously this isn't enough science related to become a doctor or anything

student: @student: science*

student: @student: includes paleography*

Freya @student: Do you think you'd like to become a doctor, or are you not sure exactly what you want to do right now? (Which is fine, btw ^_^)

student: @Freya: I have no idea about what jobs I want sorry

Freya @student: No need to apologise at all, that's totally normal! FWIW I think that as long as you don't do something very narrow and specialised for your first degree, you won't be closing down any choices later on.

In the above conversation, the student not only directly asks for (and receives) advice, the scientist is also reassuring and personable in their response.

Another conversation about career paths in science directly related to the experience of women in science:

Hannah R @all i know the science industry is encouraging women to take part and get interested in science , so did this by any chance make it slightly easier for you to get a job ?

Christine @Hannah R: Nah. Mostly because women are already interested in science, it is just an uphill battle to get established and stay.

Hannah R @Christine: fair enough

Christine @Hannah R: I just like to ask why we always focus on fixing the women..

Hannah R @Christine: oooh good point

A number of conversations spanned multiple areas e.g. a scientist's career path and the subject of their work. One particularly wide-ranging conversation went from robotics research, to programming, to educational paths, to a student's activities during lockdown. The level of comfort felt by some students was indicated by references to the personal lives or experiences of friends and family. For instance, one Year 6 student asked about cures for stomach cancer and shared that 'one of our close friends died of it 3 years yesterday'.

In another conversation, a Year 7 student expressed interest in a scientist's career:

> **Student** @Julian: when grow up i wanna be like you
>
> > **Julian** @Student: Really - stare at computer screens all day? :) Will be happy to see you.

This brief exchange is part of a longer conversation. It is indicative of rapport between the student and scientist, as well as of a student potentially identifying with the scientist.

Impact

We found evidence in all ten chats of scientist responses that are likely to lead to positive impacts. This includes the 'normalisation' of scientists and increased understanding of work in science. The prevalence of response category varied by chat. For instance, one chat involved students asking multiple scientists about what they had studied in school and the educational paths they had taken to their current positions.

Scientists valuing students' questions and comments were among the top two response categories in eight out of ten chats. That type of response is likely to support students in feeling like they can engage in scientific conversations and that science, therefore, could be 'for them'.

In one scientist's response to a Year 10 student's query:

> **Alice** @Student: Amaaaazing question! Absolutely- this is the problem with rare disease, often the symptoms are misdiagnosed, or are so unusual that a doctor cannot recognise the disease. This is why in my lab, we look at the patients DNA, which means we...
>
> **Alice** @Student: can give a definite (sometimes!!) diagnosis, and know what treatment would be best. It is not straight forward when it comes to diagnosing rare disease though, and sometimes patients have to sadly wait years to be diagnosed!

Various responses also reflected that scientists are fallible, rather than inevitably clever (indeed, there were only two references to cleverness across all ten chats), and often make mistakes. Some scientists responded that they did not have the expertise to respond to certain questions. Others described experiments gone horribly wrong. Some indicated not having always done well in school.

Another common category included responses about the educational paths that scientists have taken. These responses often reflected what might be possible for students from different backgrounds:

> **Ry** @student: I'm a first gen uni student, so I've been able to do a lot of things I didn't think possible when I was in high school!

Evidence from the analysis of live chats suggests that they were engaging experiences for students. They have strong potential to support:

- students' identification with scientists and science,
- a deeper understanding of jobs in science and pathways to them
- normalisation of science careers and scientists.

The likelihood of such impacts is further reinforced by data from teacher interviews. Teachers were unanimous in their praise for the experience. They remarked that it:

- was highly engaging
- supported their students' interest and increased their understanding of various topics in science
- provided an 'amazing' opportunity for students to learn about scientists and their work
- increased their students' appreciation of the way in which scientists are normal people:

> *'For some questions, scientists would say "well, I don't know", which is quite a good thing for students to see as well – that scientists have their specialisms and they're not all-knowing. And just to get their opinions and thoughts and from where when they were younger, how they got into science'. (Head of Science, secondary school)*

Similar outcomes were reported by teachers in the online survey. The majority felt the experience had impacted their students 'a lot'. Other impacts highlighted from the survey included:

- seeing science as relevant to them and their daily lives,
- having a more positive attitude towards science and its value,
- seeing the value of science qualifications to their interests/aspirations,
- seeing science careers as attainable (29 of 30 agreeing their students had attained this and the above three outcomes),
- seeing scientists as ordinary people like them (30 of 30 agreeing).

Spontaneous feedback in chats and emails from teachers shows expectations of these outcomes. In the words of one teacher:

> *Lovin' it! Honestly this is the best thing since lockdown :) (other than bacon sarnies) ---- Some really interesting [questions] about life in the 'real' world of work - it's really encouraging for our students to see what they are learning might actually be useful!*

Students able to take part in multiple chats were likely to have amplified outcomes, particularly when some of the scientists were the same:

> *'By the third or fourth chat, they know the scientists, so they've got other questions – so it's expanding their ability to think in terms of scientific questions as well and to be more specific... By the end, they're asking really complex questions about microbiology or the structure of a red blood cell. So it extends their learning over time and is really useful'* ***(Year 6 teacher)****.*

In addition, teacher interviews also helped identify the aspects of SAH that supported these outcomes. Unsurprisingly, the most salient element was the number of participating scientists in the chats. This improved scientist : student ratio meant that pupils could get their questions answered more easily. Consequently, more of their questions were answered, and they were likely to stay engaged through more of the chat.

Some teachers also observed that pupils were less likely to put up 'frivolous' questions in an effort to get scientists' attention. The ease of getting questions answered may have contributed to a greater focus on the science and the use of *'more thoughtful, more focused'* questions. It provided opportunities to *'ask more questions and expand on their questions'* or to *'go a bit deeper with the scientists'*, asking, for example, follow-up questions about their career paths.

Alongside the increased focus on the science, there were still opportunities to find out about scientists' personal lives. This continues to be important, especially for those generally less engaged with science:

> *'Some of them didn't ask about the science but when I got their feedback, they said things like, "I didn't know scientists had dogs!" or "I didn't know scientists would have a favourite colour." That got them into the science – just having something in common.'*

The numbers of scientists made the experience more engaging and strengthened it overall, increasing its potential for impact. Students could also ask follow-up questions

and have longer conversations because the scientists did not have to move on quickly to another student's question. This, in turn, allowed for rapport to develop:

> *'You could see that kids were able to build a bit of a rapport.'*
>
> *'They probably feel like there's more of a relationship that's built up over those 30 minutes because they're getting more responses back – so they feel more connected to them.'*

The range of scientists participating also strengthened the experience and likely further supported pupil outcomes, such as awareness of jobs in science and the different backgrounds of people who do them:

> *'If a pupil asks "What's your favourite part of your job?" they get lots of different replies and they might follow up further with one of them.'*
>
> *'The breadth of scientists meant there were more opportunities for the kids to connect with the scientists.'*
>
> *'With so many scientists, they had different backgrounds, different experiences, different educations, from different countries – so children get to see that variation and that diversity.'*

A few teachers noted that when they were not in the classroom, it can be challenging to encourage and support the lower ability pupils to ask questions Some teachers recommended modifications to make the logistical side of the chats flow more smoothly, but these did not detract significantly from an overwhelmingly positive experience:

> *'It's been more than I was hoping for – it's been supportive, it's been educational, it's been connecting, it's been inclusive.'*

Previous research into the impact of IAS on students' science capital highlighted that it aligned well with the Science Capital Teaching Approach. The research showed that participation supported multiple dimensions of science capital:

- science literacy,
- seeing science as relevant to everyday life,
- knowledge about the transferability of science qualifications
- and, especially, knowing people in science-related jobs.

In particular we found that students came to see scientists as 'normal' people. They developed understanding of their lives outside of work and had 'clever scientist'

stereotypes challenged. They also gained a better understanding of work in science: of the diversity of jobs, the routes into them, and the nature of the work.

Evaluation of SAH reflected that pupils seemed to have similar experiences to those participating in IAS pre-lockdown. Teachers also identified similar outcomes, as well as praising aspects of SAH that may have led to these outcomes. Together, this suggests that although it was not possible to gather feedback directly from students due to the pandemic, similar science capital-related outcomes as identified by our previous research are quite likely.

Although there do not seem to have been as many questions and conversations about scientists' lives outside of work, for instance, in the SAH chats, there is ample evidence that scientists were personable and friendly in the chats and that they valued the questions and comments of the students.

Moreover, analyses highlight that these sorts of more extended conversations between students and scientists took place more frequently than in regular IAS zones. The improved ratio of scientists to pupils offered more opportunities for students to experience such interactions.

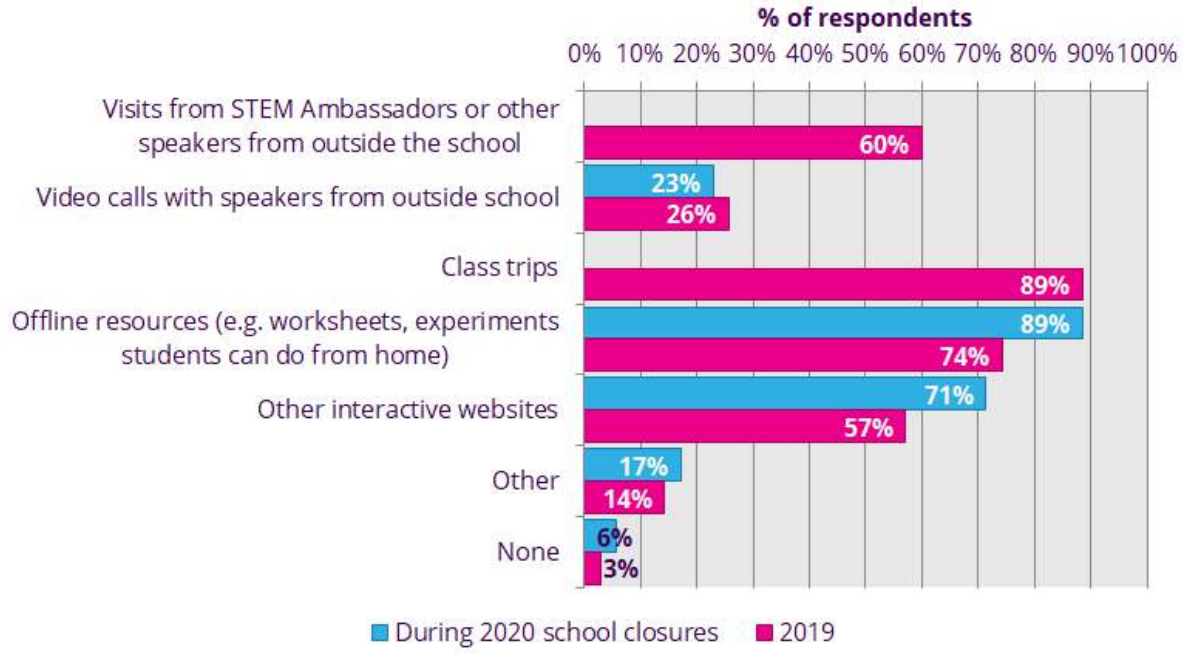
Finally, these conversations were almost entirely about science-related topics, processes and jobs. Previous evaluation highlighted that perceptions from the chats that scientists were friendly, fallible and interested in their questions played an important role in normalising science and scientists. They gave students the impression that scientists were normal people with interesting jobs. Jobs that would also be attainable by the students.

Analyses of the chats described above provides strong evidence that the experience of students in SAH was likely to have been similar or perhaps even stronger in that many of the conversations revolved around science, sending a strong message that young people can engage in such interactions. This experience recognises them as 'science people'.

Moreover, students had more opportunities for these interactions owing to the increased numbers of participating scientists. Consequently, it is not unreasonable to infer that SAH likewise supported the science capital of participating students, many of whom were from schools which are relatively underserved by other opportunities to support students' science capital.

Most teachers could not and did not make participation compulsory because some students faced restricted internet access. This meant that many of the participating students were already interested in science. However SAH still provided an experience and support for their science capital that they simply could not access anywhere else.

What else have teachers done this summer?



As part of the post-event survey, teachers were asked what other enrichment activities their school had organised for students during the school closures.

89% (31/35) of respondents reported using offline resources. 71% (25/35) had used other interactive websites.

For comparison, teachers were asked what activities had been organised in 2019 (when schools were operating normally).

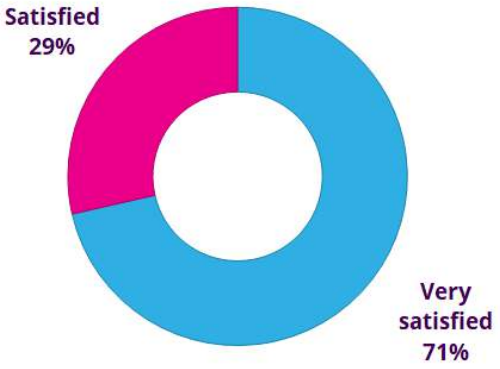
Class trips were the most popular enrichment activity; 89% (31/35) had arranged class trips.

60% (21/35) had organised visits from STEM Ambassadors or other outside speakers, and 26% (9/35) had arranged video calls with outside speakers. During school closures, 23% (8/35) reported arranging video calls with outside speakers.

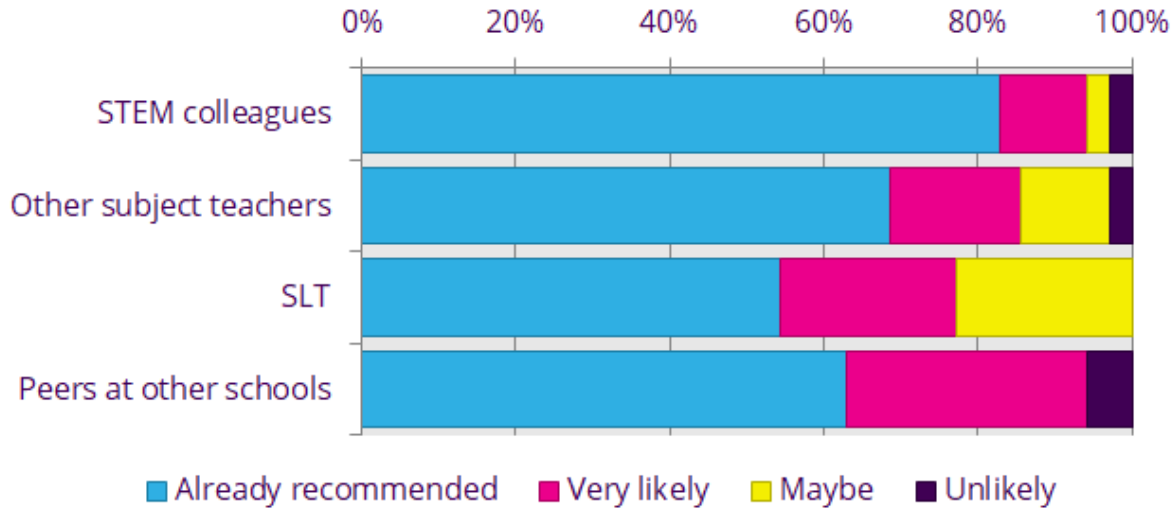
Teacher satisfaction

Teachers reported in unprompted feedback (via email and in chats), and formal surveys and interviews, very high levels of satisfaction with IASSAH.

83% of respondents had already recommended the activity to colleagues. The majority of the rest were planning to do so.



Above: *Post-event teacher survey: Overall how satisfied were you with the experience?*



Above: *Post-event teacher survey;*
How likely are you to recommend I'm a Scientist, or have you already recommended, to:

Scientists, engineers, mathematicians

Participants

2,482 scientists, engineers, and mathematicians applied to take part. 1,209 were allocated places and provided with login details for the site.

795 scientists, engineers, and mathematicians actively participated through taking part in live chats, answering questions, and posting comments.

This 34% drop out rate is much higher than we normally see. Anecdotal feedback would suggest scientists also had unpredictable workloads aren't weren't able to commit as anticipated. The high numbers of scientists in each zone also created a sense of surplus, that scientists were not desperately needed.

2,482

Scientists, engineers, and mathematicians applied to take part

795

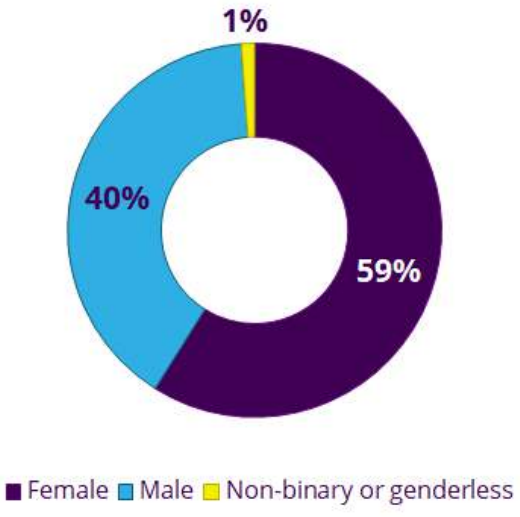
Scientists, engineers, mathematicians actively participated

Background information

A typical participant was a white, female PhD scientist, aged 25 to 29. However there was a very broad range of participants as illustrated by the following data.

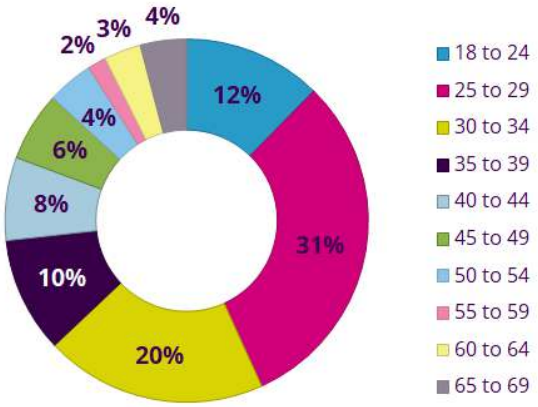
Gender

521 participants provided information about their gender, 59% identified as female, 40% as male, and 1% as non-binary or genderless.



Age groups

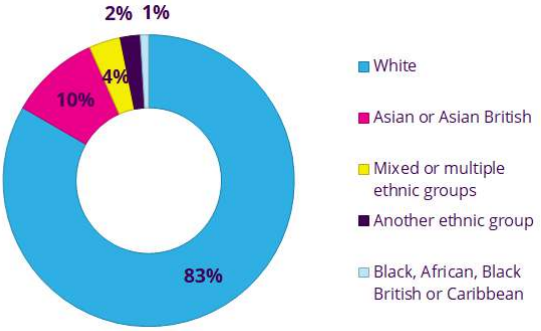
As part of the post-event feedback survey, participants were asked which age bracket they fell into. The majority of respondents (63%) were under the age of 35.



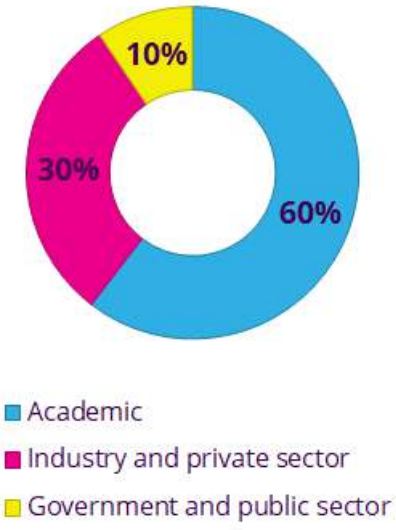
Ethnicity

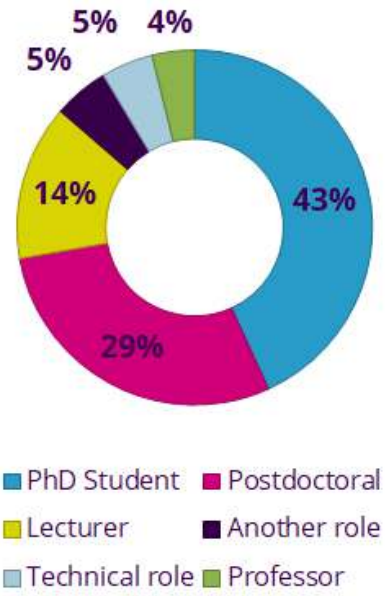
540 participants provided information about their ethnicity.

17% were from a BAME background.



Sector





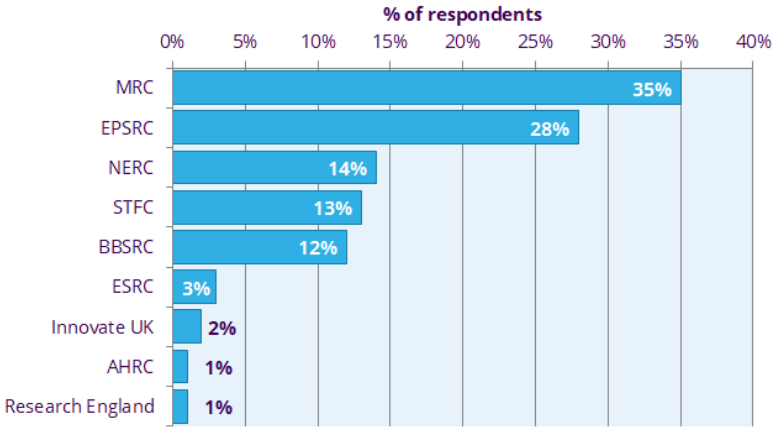
561 participants provided information about their professional background, with 60% working in academia. 31% worked in industry or the private sector, and 9% in government or the public sector.

The largest group of academics (43%) were PhD students.

Research areas and fields

Word cloud showing frequent words used on scientist, engineer, mathematician profile pages in answer to the 'My work' question:

Research councils



Participants were asked which research council(s) they were affiliated with, 322 provided information.

52% of respondents reported that they were affiliated with at least one of the research councils.

Of those, the research councils with the greatest representation were the Medical Research Council (MRC, 35% of respondents) and the Engineering and Physical Sciences Research Council (EPSRC, 28%).

48% of respondents reported that they were not funded by UK Research and Innovation.

Previous Public Engagement experience

I'm a... activities

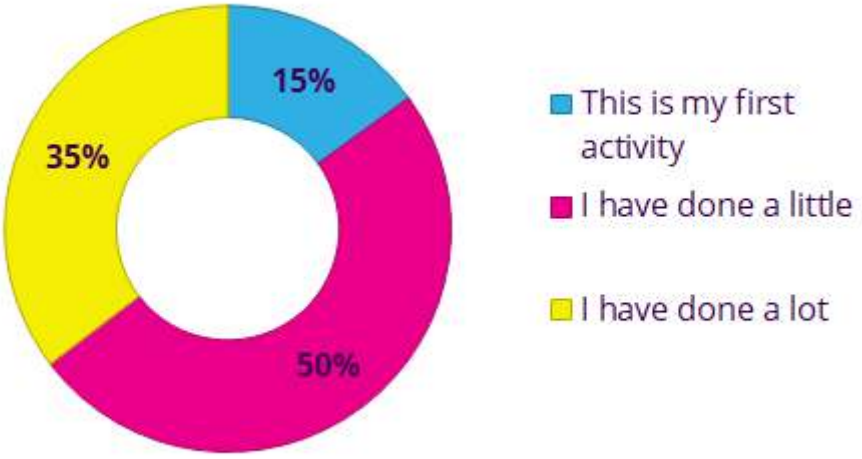
The majority of participants were new to I'm a... activities, having not taken part in previous events.

89%

Of scientists, engineers, mathematicians had not taken part in previous IAS activities

Other public engagement projects

65% of respondents were new, or relatively new to public engagement.



Scientist case study:
Miriam Hogg

Miriam is a PhD student funded by STFC

Originally I signed up because quite a few people I know had already done I'm a Scientist and they really enjoyed doing it. This is informal and I liked that because kids can ask whatever weird and wacky questions they want without having to ask in front of their peers and to someone who's just done a big presentation

This time I thought it would be a nice distraction, something new and different and interesting to break up the day a bit. And also it would help the teachers a bit and people who are stuck at home.

You could just hop in and hop out and join if you were free for 45 minutes or so and that was nice. Sometimes I'd just go onto the chat and see if there was a chat going at that particular time. The last 2 weeks I got too busy on my thesis and my paper submission to join in which was disappointing, but I managed to go to a fair amount at the beginning.

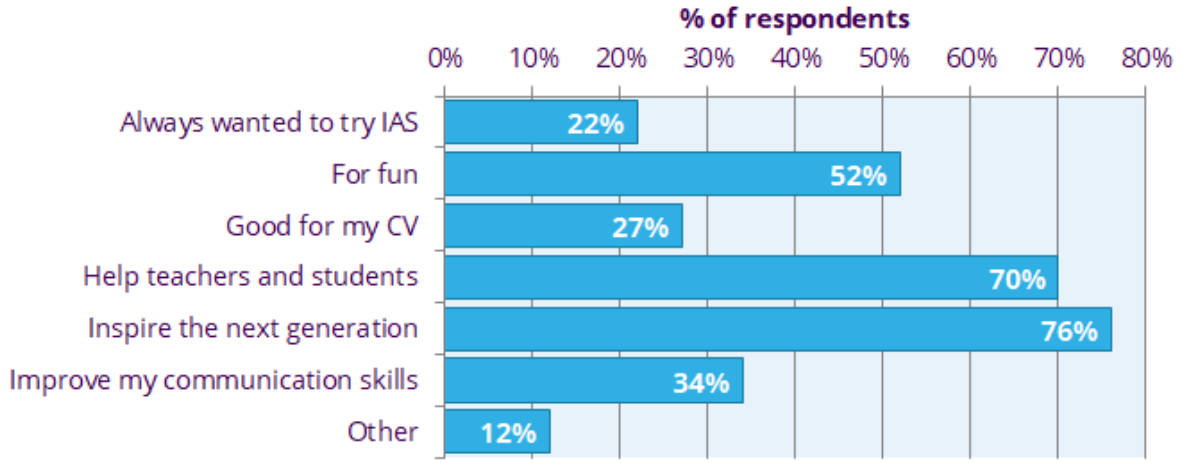
This time I noticed because there were fewer students, you'd end up having an entire conversation with them. There were a few times where I'd literally just chat to 2 or 3 students cos there was 8 on the chat, and they'd just choose someone and ask a question and ask followup questions from there. It's been good practise for talking to non-scientific audiences and being able to explain an idea on a level that people understand it.

It's made me more interested in talking informally, rather than formally. I'm quite shy but with an informal setting, where it's more of a conversation, it's a lot nicer and also more natural in a way: you are not leading the conversation, you're letting it evolve naturally. I prefer that to doing a presentation where they're going to sit and scroll through their phones.

Engagement during school closures

Motivations for taking part

As part of the post-event feedback survey, participants were asked their motivations for taking part.



The most common reasons given were to inspire the next generation (76%) and to help teachers and students (70%).

When asked to give other reasons, a common response was from participants looking for an activity to take part in while on lockdown or while working from home.

Other public engagement activities

As part of the post-event survey, participants were asked what other engagement activities they had taken part in during the school closures.

A number of participants reported that they had not taken part in any other activities.

> *None! This was an absolute liveline - thank you so much for setting it up!*
>
> *Only this; lot of hands-on activities with charities before lockdown. I couldn't find many online in these times.*
>
> *This has been my main activity as unable to physically attend schools.*
>
> *None - this is the limit during covid closures as all other things I've usually done as a STEM Ambassador have been face to face and hence cancelled*

Other participants discussed preparing online resources:

> *Prepared a PowerPoint Presentation for the Dundee Science Center*

I have made a couple of vlogs to help students know what it is like with apprenticeships through the Covid-19

Lots of Zoom career talks

Recording an interview podcast about how I use maths at work

I did an online discussion with a retiree group about an area of my research

Virtual tour of our facilities (datacentre) -producing/compiling resources for a social media campaign focused on "Science at Home" resources -work experience webinars -helped with virtual Coding Club activities

Others had taken part in online conferences, or discussion panels:

a discussion on stem engagement online hosted by exeter university a live discussion hosted by kent university on mary rose conservation work

Others had had discussions with family and friends:

A couple of 1-on-1 conversations with pupils that are children of friends, etc

My husband (also an oceanographer) and I ran 10 weeks of online science experiments for our kids and their school friends during the shutdown.

Ran a family science club via WhatsApp for my nieces and nephews.

Activity

Live chats

Numbers

774

Live chats

766

Participants active in chats

96,790

Lines of chat from scientists, engineers, mathematicians

3,685

Equivalent hours of engagement in live chats

2,209,385

Words written by scientists, engineers, mathematicians in live chats

The mean number of chats attended by scientists was 7.3. However the median was just over 5. This hints at the effect of 'super-chatters'; a small group of extremely active scientists who participated in more than 40 chats each. On average chats were attended by 7 scientists.

Number of chats attended by scientists

- 132 people took part in 1 live chat
- 263 people did 2–5 live chats
- 222 people did 6–20 live chats
- 60 people did more than 20 chats
- 8 people took part in more than 50 chats, with 2 taking part in 100 or more

As part of the post-event survey, participants were asked if they joined the number of chats that they expected to join. 50% reported joining about what they expected to, 37% reported joining fewer than expected.

When asked why the number of chats they attended differed from what they expected, participants gave reasons including going back to work, or their other time commitments being greater than anticipated. Some participants also talked about having fewer schools taking part in certain zones than was anticipated.

> *Work commitments. At the start of the programme I was furloughed and had free time.Halfway through and towards the end, I was called back into work and was full time by the end of the programme. So didn't have time to take part during the hours' students were available.*

Scientist case study:
Laura Durrant

Laura is a DNA Pipelines Research Assistant at Wellcome Genome Campus.

I saw I'm a Scientist advertised by the Wellcome events team on Twitter. At the time I had a lot of spare time on my hands and I thought I'd do something useful.

I hadn't done outreach beforehand and taking part in this has made me want to get more involved in STEM outreach activities, especially at this time.

The chats are busy and inquisitive. There's lots of questions that get thrown around and, sometimes you have sub-chats going on, people having their own conversations.

I found it really useful that you could work the chats and the questions around your day-to-day work life. It was nice to have that flexibility when work in the lab started picking up again.

I've definitely been able to work on my science communication skills throughout this because I've been so used to communicating at an academic level. Being able to test the waters with younger students has helped me to try and talk about science on a more casual level, rather than using big fancy words all the time.

For the students, I think my participation helped extend the possibilities of science, showing you don't necessarily have to be deeply involved in research to be part of the science. For example, in my role I get to learn things everyday about the DNA samples and the science they're involved in. It shows that you can broaden your horizons, it doesn't have to be research based all the time.

It's also nice to see other scientists being passionate about what they do and seeing the students reciprocating. It's been good for morale, especially during lockdown. It ran really smoothly, it was easy to see how everything worked and the instructions were really clear as well.

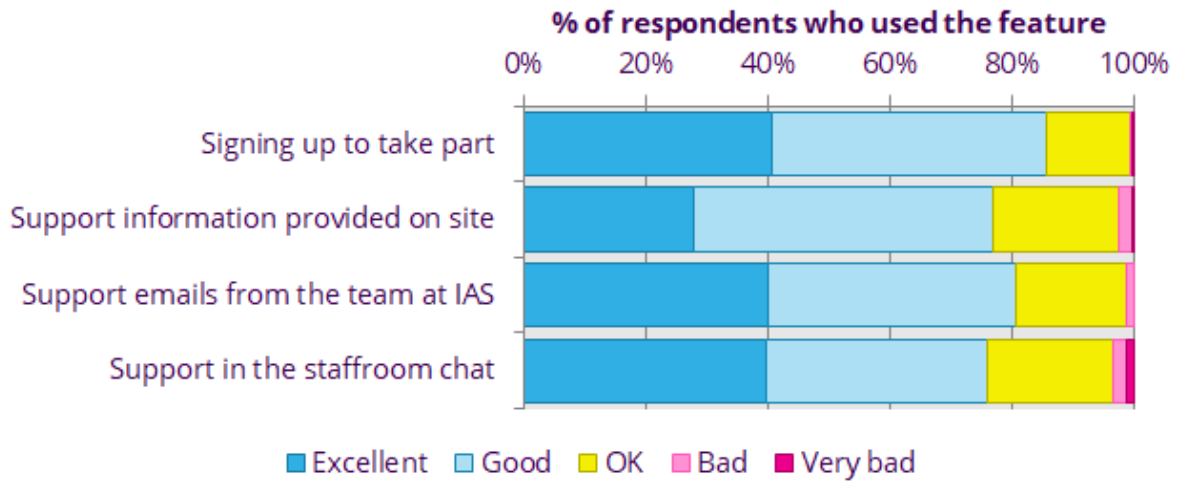
Where I went to school, there weren't a lot of STEM activities. So it's really encouraging to see these students wanting to know more and getting engaged of their own will. It's inspired me to get more involved and help those students on their way.

Experience

Quality of experience

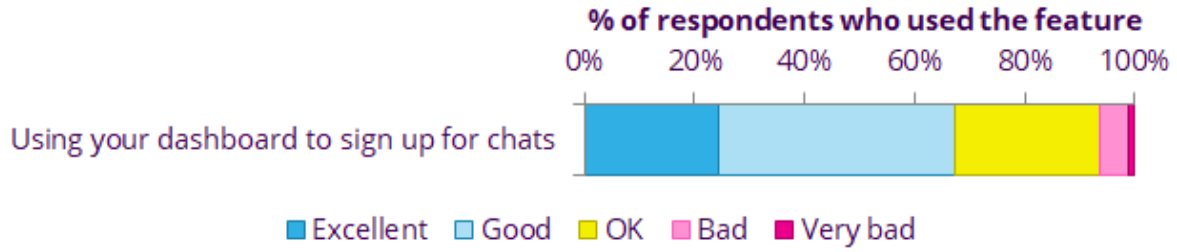
As part of the post-event participant feedback survey, people were asked how they found their experience with different aspects of the project. Respondents also commented on ways in which they felt the experience could have been improved:

Onboarding instructions and support

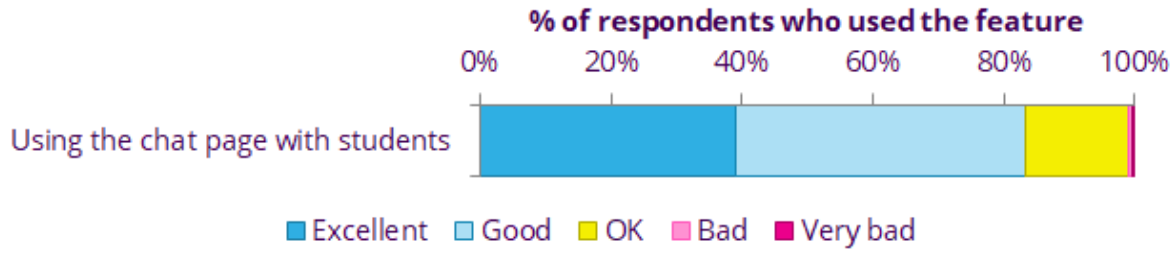


Note: The staffroom was used by only 34% of respondents.

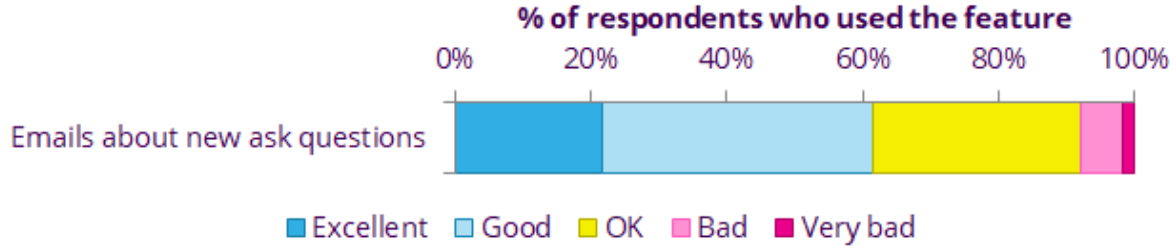
Chat Booking



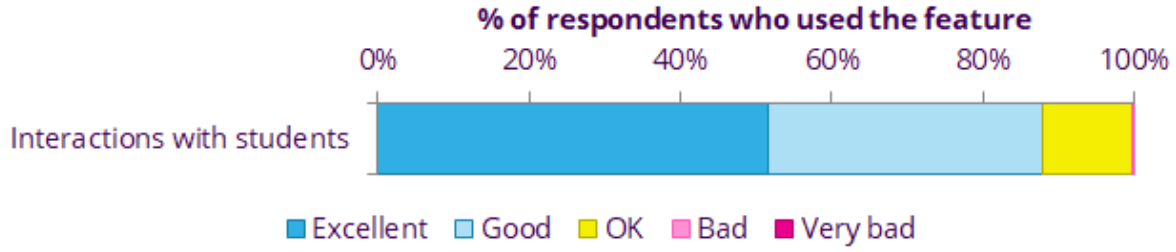
Chat Engine



Number of emails



Interaction with students



Number of students and other scientists in chat

A number of respondents commented that they felt there were often too many other scientists in chats, especially in comparison to sometimes relatively low number of students.

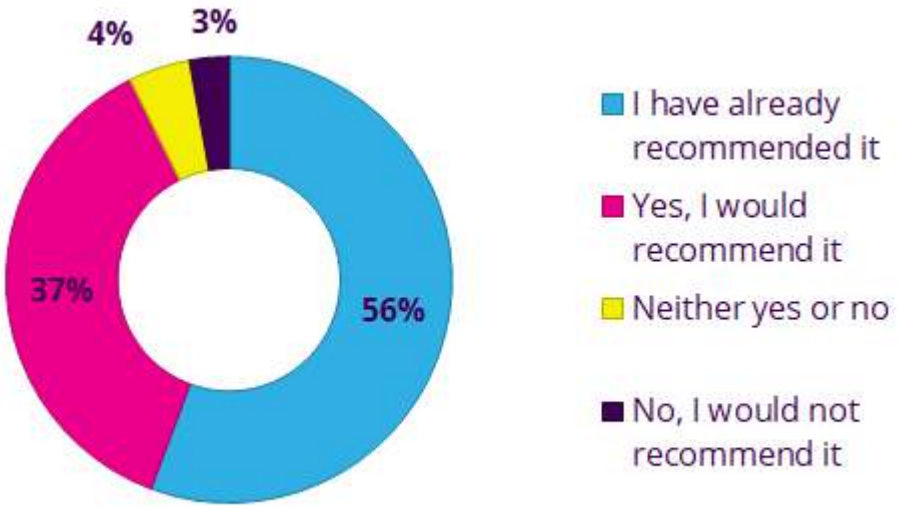
> *It would be helpful to have fewer scientists in the chat rooms because otherwise it becomes a bit chaotic for the stud nts and scientists*

Often more scientists than students in the chat, would be good to have more even distribution.

When asked however to rate their experience interacting with other participants, 50% reported that it was 'good' or 'excellent'; 14% said that they did not interact with other participants.

Overall satisfaction

At time of writing, 211people who took part in SAH have already applied to take part again this autumn.



93% of respondents reported either that they would, or already had, recommended taking part in future IAS activities to their colleagues.

Development work

Site

Summary

Our plan for SAH was to radically increase the capacity of the site in order to accommodate 5% of UK schools. It would mean involving a high number of new teachers rapidly without the usual office infrastructure of support.

That required the following:

- Improved students registration and consent processes
- Multiple concurrent chats in a zone
- Efficient, user centric booking system
- Efficient process for scientists to accept
- Improved reporting systems to help teacher ensure student compliance

Registration
(Creating users on site)

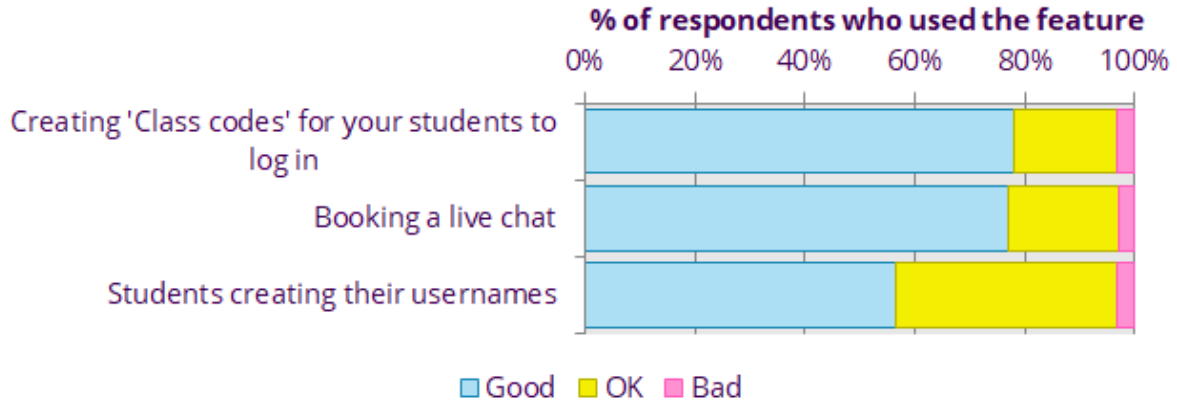
IAS has had an online registration system for many years. It was developed for events where teacher packs couldn't be distributed. It involved teachers displaying a URL in the classroom and students visiting that page and filling in the form.

It was OK for situations with teacher support in the classroom, but the Green Zone pilot confirmed that it wasn't optimal for thousands of students registering at home.

The improvements made:

- Students using page correctly linked to teacher account and class code
- Class code linked to chat booking so registration URL can be sent with chat booking
- First name and last name fields so teachers could see how had registered
- Email and password validation

Teacher feedback:



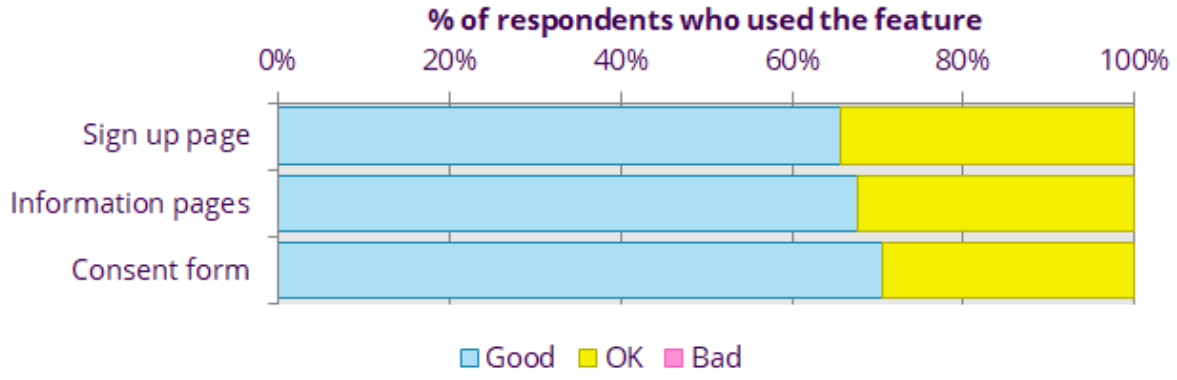
Consent process

The old consent process required teachers to read and sign a consent form as part of their application, before setting up their own account on the site. This caused a barrier for many teachers who may have been unclear about what the activity entails. They were being asked to give consent for their students before they were able to access the site themselves and understand how it works.

We changed the consent process so teachers are now asked to give consent for their students **at the point of creating a class**. This allows a teacher to set up their own account, explore the site, read the resources, test the chat in the staffroom and join an open chat, if they wish, before deciding to give their students access.

Since changing the process, there have been no issues around the consent process; no teacher emails, or queries.

Teacher feedback:

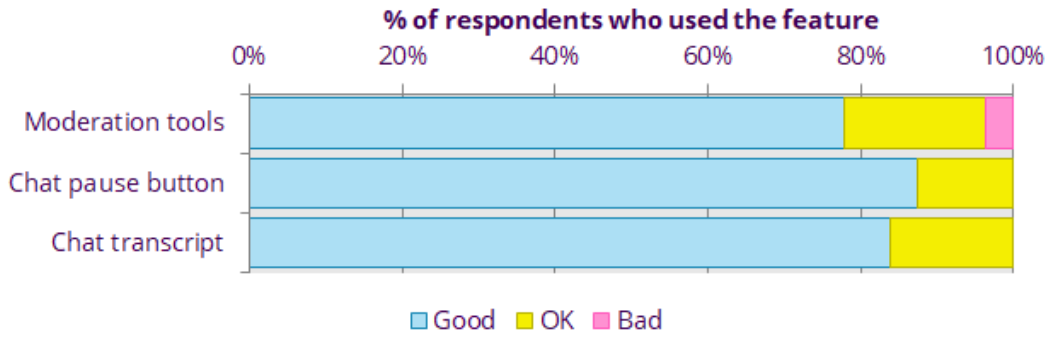


Live chat Engine

A number of technical improvements were made to the live chat engine:

- Pause function
    - This allows teachers logged into the chat, the control to temporarily prevent students from typing messages.
- Multiple concurrent chats within the same zone
    - In increasing capacity, and the number of scientists taking part in a zone, it became necessary to run multiple chats at once within the same zone.
- Teachers able to delete and ban scientists from the chat (this was so teachers could moderate the chats themselves so needed more control)
- Chat transcripts. Previously transcripts were available as .csv spreadsheet. Now they can download a threaded, PDF of the live chat either with deleted lines or without.
- If not logged in, a user will now see an option to login within the chat area . This works well on mobiles where the chat screen locks in place and you cannot scroll as freely.

As part of the post-event survey, teachers were asked to rate the moderation tools in live chats for ease of use:



Chat bookings and calendar

- Our previous chat booking system was designed to work with 3 chats per day per zone. Teachers would be informed on confirmation if the slot they had chosen was available.
- Scientists would confirm attendance by commenting on the booking entry.
- Our capacity modeling was going to require 24 chat slots per zone per day.
- The booking form and calendar was reconfigured to provide additional flexibility and to allow teachers only to choose available slots.
- Teachers have the option to cancel their booked live chats, from their dashboard.
- Teachers receive an email containing instructions to pass on to their students.

- Scientists can now accept or reject chat bookings in their zone, from their dashboard.
- Students can see the list of chats their teacher has booked for them and the scientists who have accepted, on their dashboard.

Reporting

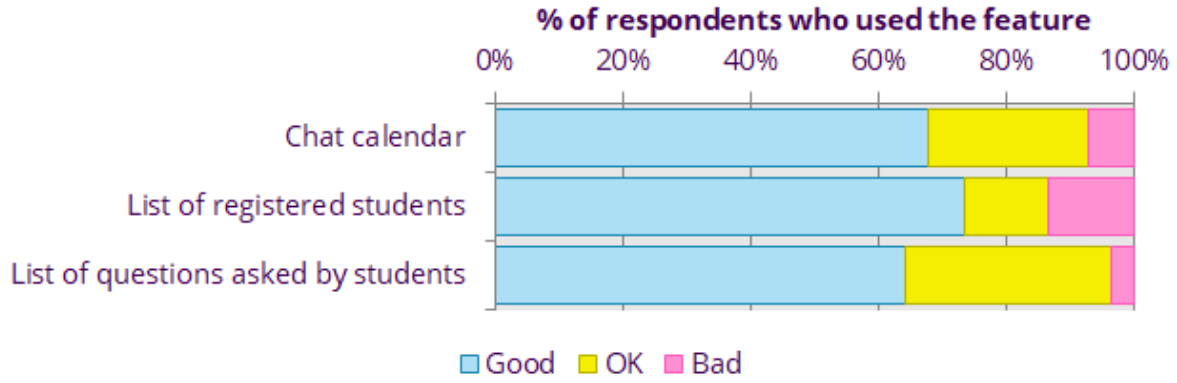
Development of reporting systems for teachers including:

- Student registrations
    - On their dashboard, teachers are able to see lists of students who have logged in using their class codes.
- Student question reporting by class
    - On their dashboard, teachers are able to see which of their students have asked questions, and what questions they have asked.
- Live chat transcripts
    - HTML chat transcripts can be printed with and without deleted lines.
    - Chat transcripts are more user friendly, and easier to understand.
    - Optionally removing deleted lines of chat allows teachers to choose whether they want to see lines of chat that were removed. This may be useful for teachers who want to use the transcript as a learning tool to review the discussion, or to see which of their students wrote inappropriate lines.

User dashboards

Dashboards for teachers and scientists were created as a hub for information about their participation in the event.

As part of the post-event survey, teachers were asked to rate sections of the teacher dashboard for ease of use:



Back end systems

Helpdesk

The Hubspot application was used as a shared inbox for support requests from participants and teachers. Previously participants contacted individual team members' emails with their requests.

Using a shared inbox meant:

- All team members could see potential issues
- The most appropriate person could be assigned to help
- Team members could see outstanding requests to make sure nothing was missed
- The team could discuss how to help within the helpdesk

Overall, use of the helpdesk sped up support and helped the team keep connected to the experience of participants.

Database management

Live chat management

- Auto creation direct from bookings on site into table
- Auto matched to teacher, school for analysis on bookings
- Mod reports standardised, auto matched to scientists attended
- Generation of emails to send transcripts to teachers following chats, or follow up with teachers whose students did not attend

Data analysis

- Teachers, schools, live chat bookings, reports, transcripts, scientists attending chats all tied together to allow real-time activity overview

Communication plans

- Allowed view of user activity combined with what communications they had been sent
- Allowed for more customised communications to users

Teacher support

Centralised information on activity meant that we were able to send teachers personalised emails offering support:

- Teachers who had not logged were offered support, and asked whether there was anything we could do to help
- Teachers who had logged in but not booked a chat were offered assistance booking chats
- Teachers who had only booked one chat were advised that they could book additional chats

Emailing teachers transcripts

Improvements to site reporting features (live chat transcripts[13]) together with improvements to back end database systems meant that we were able to send personalised emails to teachers after their live chats including a link to the transcript of their live chat, and inviting them to book additional sessions, or — in instances where fewer students attended — suggest they may like to invite more students to the live chat.

On-boarding automations for scientists, engineers, mathematicians

Participating scientists, engineers, and mathematicians were sent a short series of automated welcome emails once they were given a username on the site. The purpose was to:

- Ensure all participants received reminders about key information and that they understood what they needed to do — complete their profile, sign up to live chats — without overwhelming them.
- Quickly establish a relationship and prompt them to contact us early with any issues, allowing the support team to help and get them engaging with students.

After the first week of welcome emails, participants were prompted to share the SAH opportunity with their colleagues and any friendly schools, helping to grow the event.

Automating the emails meant we could be sure that all participants were receiving key information consistently, without needing a team member to manually write and send identical emails repeatedly.

[13] See also: *Development work; Site; Reporting*

GDPR

Previously, when creating their accounts or editing their profiles, students were asked for information including:

- Full name
- Email address
- Year group
- How they identify (“girl”, “boy”, “in another way”)

We used this information to identify students in the event of a safeguarding concern, send them updates on the activity and for evaluating what questions different students asked.

In SAH, we wanted to make it as simple as possible for students to register on the site. This meant only asking for personal information if it was needed to run the activity. We needed to ensure that teachers could identify their students, so they knew which of their class had created an account and to identify them in the event of a safeguarding concern. Students needed to be able to set a secure password. We also needed to contact the student when their questions were answered.

In SAH, we amended the student registration to only ask for:

- Full name
- Email address

Promotion

Direct promotion to IAS lists

Promotion to teachers and schools

Teachers who had previously registered to take part in IAS and IAE activities were sent multiple emails over the course of the activity. With specific emails targeted by subject and school phase.

Promotion to scientists, engineers, mathematicians

We emailed all scientists and engineers who had previously applied to IAS and IAE with the sign up form and also asked them to pass on to their colleagues. We also asked new signups to share the form with their colleagues

Social media - We posted the sign-up form regularly on our Twitter, Linkedin and Facebook pages

In total 1,634 scientists and engineers signed up through our main form.

Promotion by third parties

Individual partners

Funders and partners were provided materials — individualised promotional copy, social media graphics, individual sign up pages on the SAH site — to share with members and networks.

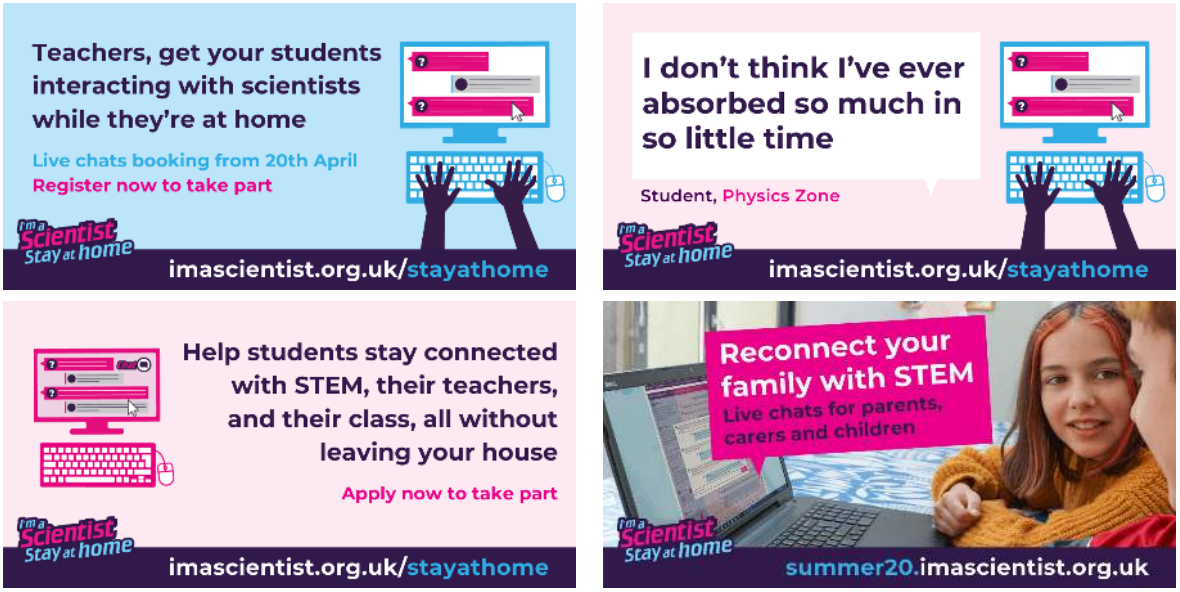
Funders and partners were given bespoke pages and sign ups forms to promote to their networks. A total of 176 teachers, and 854 scientists, engineers, and mathematicians signed up through partners' forms.

General materials

In addition to materials created for individual funder organisations, materials were provided on the site[14] which supporting organisations and individuals could use to help promote the activity with their networks.

Materials included:

- Social media graphics
- Promotional copy for teachers and researchers
- Photography and SAH logo files for use in blog or news posts



Above: *Example social media graphics*

[14] https://imascientist.org.uk/stayathome/promotional-materials/

Funders and support

Core funding

UK Research and Innovation (UKRI)

Provided core funding for *I'm a Scientist, Stay at home*

Wellcome Education

Funded the Green Zone pilot which made the SAH activities possible

Zone funding

bp PLC
Funded the Coding Zone

> *"bp is committed to helping to close the STEM skills gap in the UK. The future needs a steady stream of talent with a strong foundation in science, technology, engineering and maths who will continue to drive progress and innovation and solve challenges in years to come. Interacting with people in those careers can inspire students and show them the exciting opportunities available."*

British Psychological Society (BPS)
Funded the Psychology Zone

Johnson Matthey PLC
Funded the Chemistry Zone

Medical Research Council (MRC)
Funded the Medical Research Zone

The Ogden Trust
Funded the Physics Zone

"It is important for young people to be able to understand what it is like to work in physics. These opportunities for direct communication give a rounded view of physicists and ideas of their activities and interests in physics and more broadly."

The Royal Society of Chemistry (RSC)
Funded the Environment Zone

"We exist to support future generations of scientists and are delighted to lend our support to this unique form of engaging, stimulating and relevant interaction with current scientists."

Tomorrow's Engineers
Funded the Tomorrow's Engineers Zone

"Engineers shape the world we live in, transforming lives and tackling global challenges with their creative solutions and innovations. I'm an Engineer gives young people a valuable opportunity to ask engineers about what it's like working in engineering and to think about how they might be able to make a difference as an engineer in the future."

Wellcome Genome Campus
Funded the Disease Detectives Zone

"It is really essential for young people to have the opportunity to engage with a diverse range of scientists to develop their interest in science, but also to see all the potential careers out there waiting for them."

Additional funding

Tideway
Supported Women in Engineering Day activities

"We want more young people to know about the range of careers and opportunities that engineering and construction can offer them. There are exciting times ahead in the industry where technology, environment and innovation will be even more intertwined to all aspects of construction.

What better way for someone to make their own mind up than talking directly to engineers working on the Super Sewer?"

Additional support

British Science Association (BSA)

"We want more young people to see science as part of their everyday lives. By talking directly to scientists, young people can be inspired and encouraged to develop a life-long relationship with science."

STEM Learning

"STEM Ambassadors give their time to inspire the next generation into the world of STEM.

Enabling young people to meet scientists, have fun with the subject and quiz them about their work is a brilliant way to engage students and challenge stereotypes surrounding STEM careers."

Contact

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