I'm a Scientist,
Get me out of here:

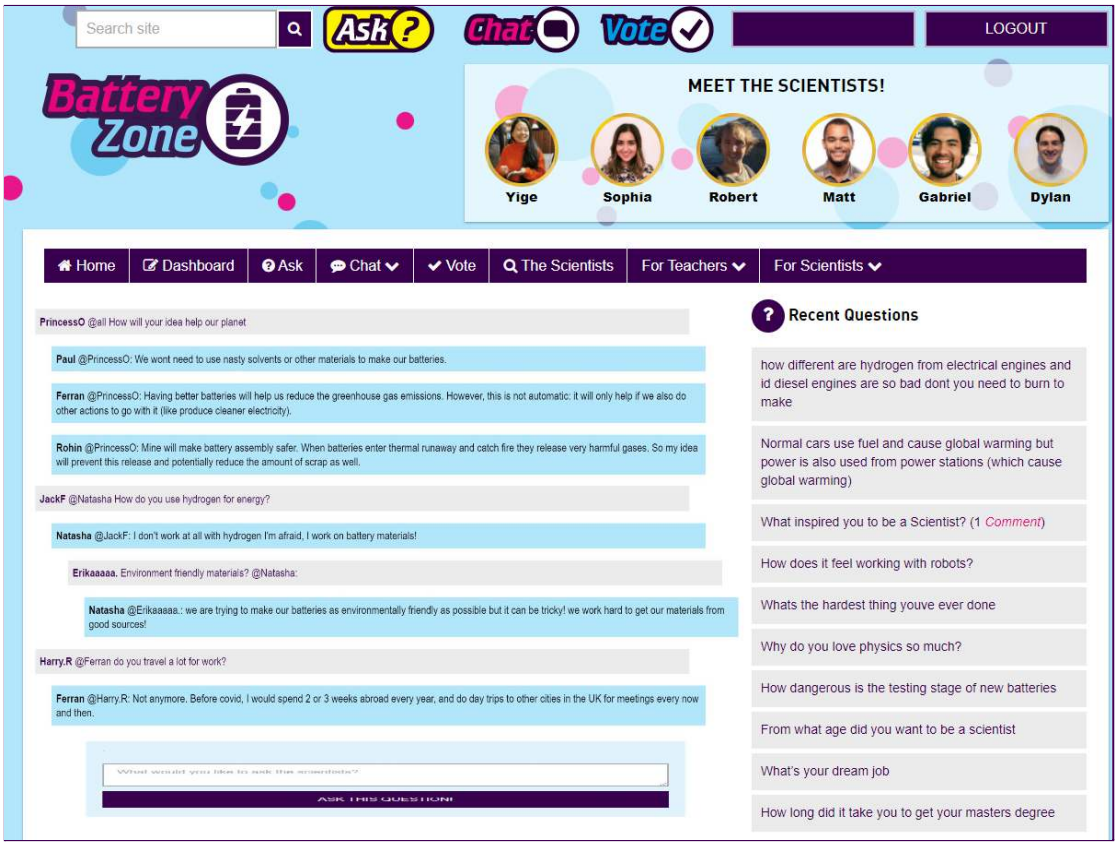
2013–21 RSC Zones Evaluation Report

December 2021

MangorollaCIC

ROYAL SOCIETY OF CHEMISTRY

Background



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

Scientists create profiles on the website and engage directly with school students through real-time, text-based chats and answering posted follow-up questions. 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.

Between 2013 and 2021 the Royal Society of Chemistry (RSC, rsc.org) funded or part funded 32 IAS zones to engage students with chemists. This report is a summary of the activity in, and an evaluation of, the impact of those zones.

Contents

Summary

- **We ran 32 zones between 2013 and 2021 that were funded or part funded by the RSC.**

- **Students interacted directly with scientists in 669 live chat sessions:**
    - Students from 401 schools took part.
    - Students asked 19,543 follow-up questions.
    - 61% of participating UK schools were widening participation schools and/or located more than 30 minutes drive from a major research HEI.

- **377 scientists took part:**
    - A wide range of scientists' backgrounds provided students with insight into different careers, fields and routes into chemistry.

- **Majority of conversations in live chats were around chemistry:**
    - 51% of conversations contained chemistry related words.
    - 26% of questions by students in 'Ask' and 55% of answers from scientists were focused around chemistry topics.

- **Taking part has a positive impact on participating scientists:**
    - 82% of respondents reported an increase in skill in communicating with lay people.
    - "*Taking part and winning has increased my reputation for outreach and I am asked to do outreach for the lab more now*" (Scientist feedback)

- **71% of participating scientists were more interested in continuing with other forms of engagement activities after IAS:**
    - "*A very positive experience that definitely encouraged me to engage more with the public and look out for outreach opportunities.*" (Scientist feedback)

- **Taking part in IAS supports students' science capital:**
    - IAS maps well onto the Science Capital Teaching Approach, supporting science capital dimensions including: *science literacy, seeing science as relevant to everyday life, knowledge about the transferability of science/science qualifications*, and especially, *knowing people in science-related jobs.*

Participants and activity

Summary of activity

Between 2013 and 2021 we ran 32 zones funded or part-funded by the RSC:

June 2013
Energy Zone

March 2014
Colour Zone

June 2014
Water Zone

November 2014
Spectroscopy Zone
Chemistry Careers Zone
Drug Synthesis Zone
Sustainability Zone (IE)[1]

March 2015
Molecules Zone
Materials Zone
Green Chemistry

June 2015
Polymers Zone
Colour Zone
Lutetium Zone

November 2015
Spectroscopy Zone
Drug Synthesis Zone (IE)
Food Science Zone (IE)

March 2016
Biochemistry Zone
Climate Change Zone
Toxicology Zone

June 2016
Catalysis Zone
Antibiotics Zone
Mercury Zone

November 2016
Energy Zone
Drug Discovery Zone
New Materials Zone (IE)

November 2019
Elements Zone

March 2020
Energy Zone

April to June 2020
Environment Zone

November 2020
Health Zone

March 2021
Molecule Zone

May 2021
Orange Zone

October 2021
Battery Zone

[1] The RSC also funded four zones in the Republic of Ireland that were run on our Irish *I'm a Scientist* platform: https://imascientist.ie/

Key figures	Total	UK	Republic of Ireland
Number of Zones	32	28	4
Scientists	377	357	20
Schools[2]	401	361	40
Students logged in	13,519	11,932	1,587
Active students[3]	86%	86%	89%
Live chats	669	598	71
Lines of live chat	181,294	163,477	17,817
'Ask' questions asked	19,543	17,743	1,800
'Ask' questions approved[4]	7,971	7,171	800
'Ask' answers given	17,736	15,998	1,738
Votes	10,298	9,118	1,180

Zone reports

Zone reports summarise activity data, show examples of good engagement, and preliminary feedback.

These are published following each event and are available online: [https://about.imascientist.org.uk/category/zone-reports/]

[2] 13,519 Students from 401 schools took part in the zones. 35 schools took part in more than one RSC funded zone. See also: *Participants and activity; Participating schools*

[3] 86% of students actively engaged through asking a question, taking part in a live chat, casting a vote, or posting a comment.

[4] Excludes duplicated questions

Participating schools

13,519 students from 401 different schools logged in over the 32 RSC funded zones. 86% of students actively engaged by joining a discussion, asking a question, posting a comment, or casting a vote.

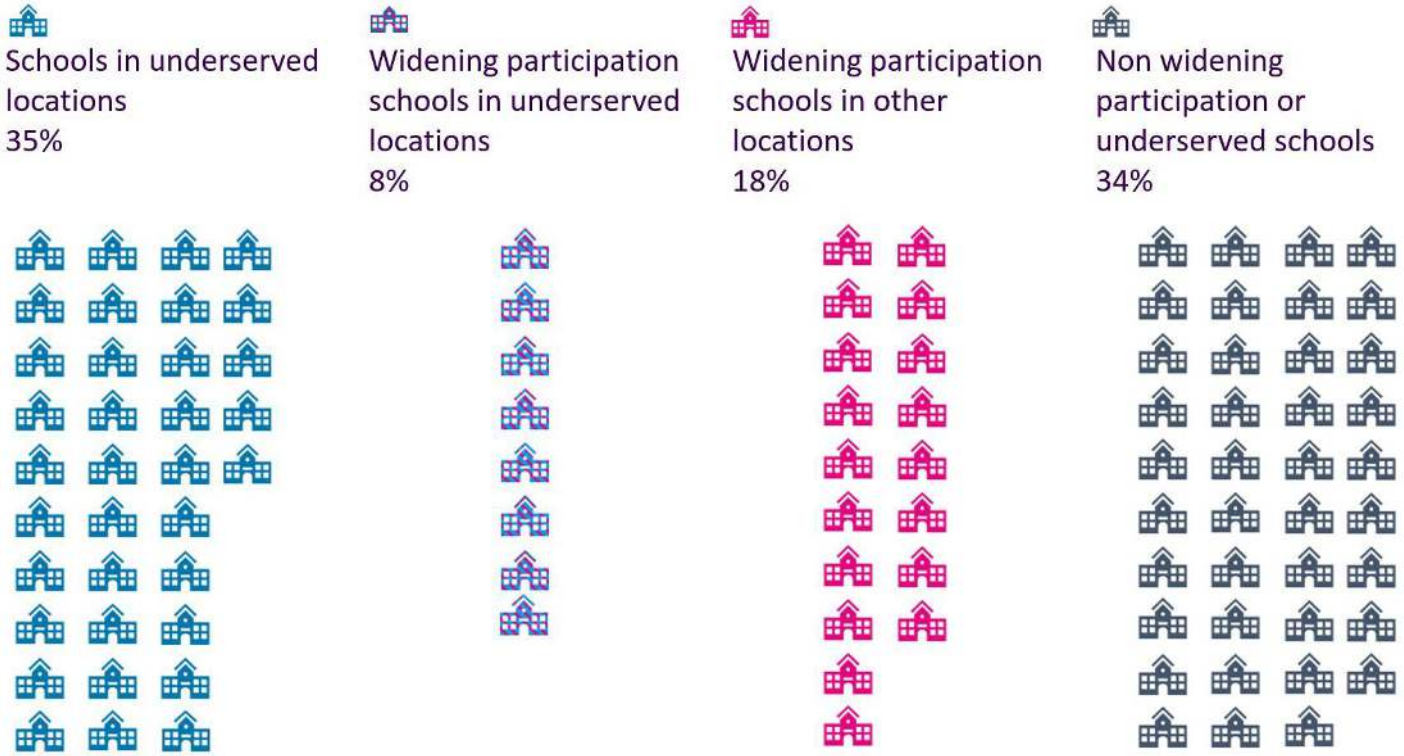
The map to the right shows the locations of participating schools across the UK, Jersey and Ireland.

The map below shows all participating school locations.

Underserved and widening participation schools

We work to prioritise schools in geographically underserved areas and widening participation schools.[5]

61% of participating UK schools were underserved or widening participation schools.



43% of participating UK schools were located more than 30 minutes from major research HEI (underserved locations). Our research shows that these schools are half as likely to get a visit from a university scientist than schools within 15 minutes of a HEI.[6] Taking part in IAS gives students at these schools access to researchers and other scientists.

26% of participating UK schools were widening participation schools.

[5] Widening participation schools are counted as those with above average percentage of students eligible for free school meals (currently more than 14%); or in Scotland, where more than 20% of pupils live in the 20% most deprived datazones. Underserved schools are those more than 30 minutes drive from a major research HEI. Read more: about.imascientist.org.uk/under-served-and-wp/

[6] imascientist.org.uk/distance

Participating scientists

In total, 377 scientists took part in the chemistry based zones.

Scientists from UK-based institutions, universities and the NHS took part. Representing a wide range of areas within chemistry, allowing students a greater insight.

The map (right) shows the locations of scientists that participated.

Are students asking about chemistry?

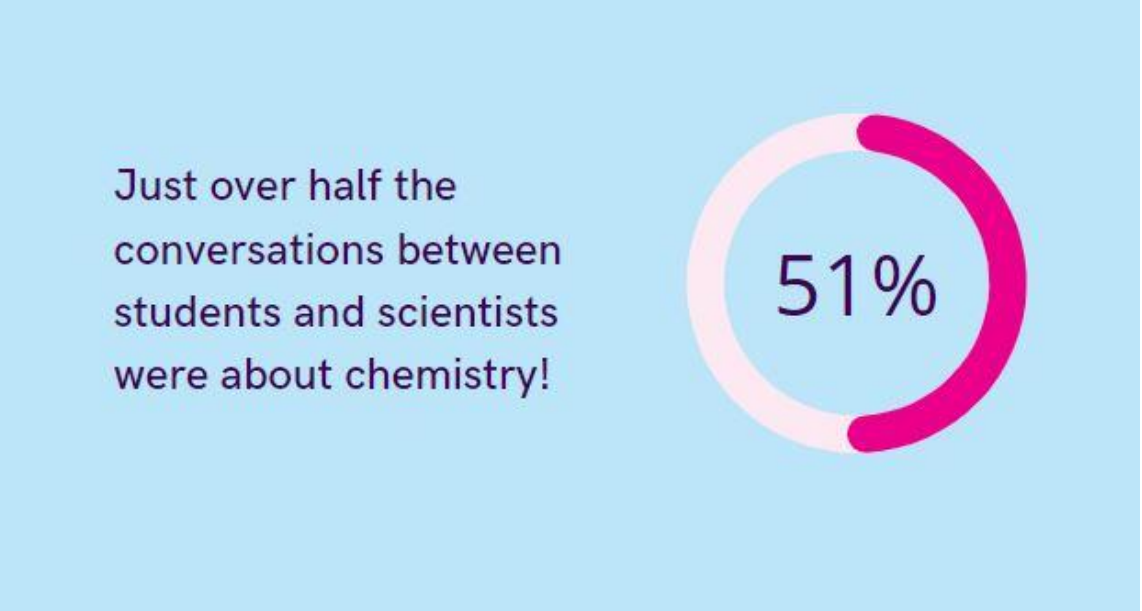
Scientists and students can interact in two different interaction types.

We received a word list from the RSC containing chemistry related terms and combined this with words that were used within the live chat sessions[7]. Using that we determined the proportion of chemistry related conversations between students and scientists across text-based chat and follow-up questions.

A conversation was classified as relevant if the conversation included a word from the list.

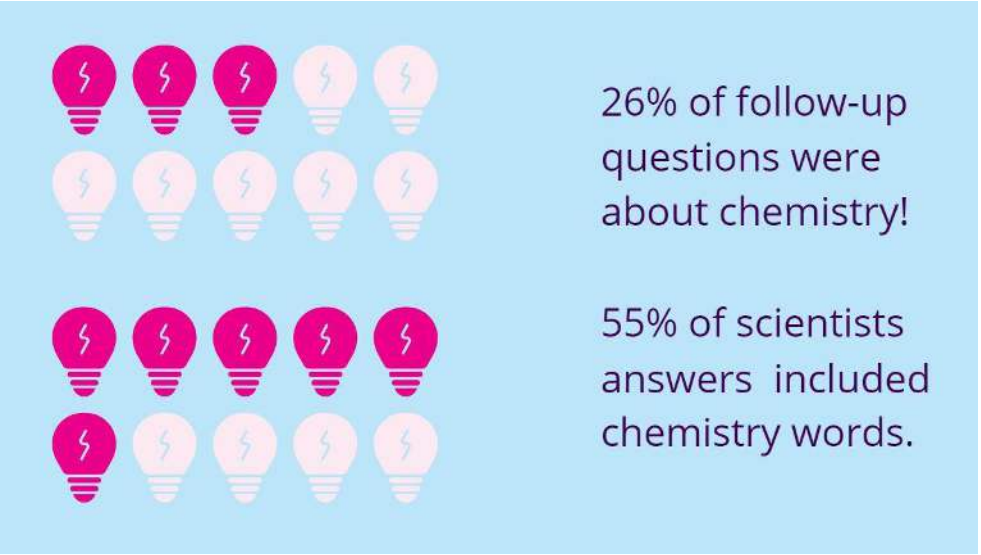
Chemistry conversation in live chats

Live chats offer a reply function, where users can reply directly to one another, creating 'threads' of conversation.



[7] The chemistry word list contained 978 words. Examples are: *'nitrogen', 'molecule', 'liquid', 'catalyst', 'amino acid', 'bunsen burner', 'carbon', 'solubility', 'sulphuric', 'bromide'*

Questions and answers in ‘Ask’ containing chemistry related words



Examples of chemistry related interactions

Conversations in live chats

Student: Do you know any ways to cut down ***greenhouse gases***?

Scientist: Hopefully my research can help to cut down ***greenhouse gases***! One of the things the ***materials*** I work with can do is capture ***carbon dioxide*** or other ***greenhouse gases*** so that they aren’t in the air anymore

Student: So will that help slow down global warming?

Scientist: Yeah that’s the idea! It could be one of many things that help to do that, like reducing emissions in the first place. My ***materials*** can hopefully also help with that, because they can be used for ***gas*** separations too, which take a lot of ***energy*** the way we do them now.

Student: Oh wow that’s great! I can’t wait to see this become popular if it works.

Student: Is it true that ***atoms*** don't actually touch?

Scientist: That's such a deep question! ***Atoms*** are made up of smaller ***particles*** that interact in different ways. They aren't really ***solid*** objects, so I suppose you're right and they can't touch if they're not one fixed thing...

Student: What are you doing to make upcycling ***batteries*** work? What will they be made of?

Scientist: I am extracting the ***cathode material*** and transforming it into a high capacity ***anode material*** that can be used in new ***lithium-ion batteries***! The ***cathode material*** is a manganese ***oxide***.

Student: What is an ***atom***?

Scientist: An atom is the smallest ***matter*** that makes up ***chemicals***, e.g. ***water***, ***oxygen***. It is made of ***electrons***, ***neutrons*** and ***protons***.

Follow-up questions

The bold words are examples of chemistry related words.

These questions represent subject interest and support science capital by making the science relatable to everyday life.

Carbon is above ***lead*** in group 4. I thought ***elements*** were more ***reactive*** as you go down a group in the ***periodic*** table, but ***carbon*** is above ***lead*** in the ***reactivity*** series. How come?

— Student question

Does ice cream made using ***liquid nitrogen*** taste nicer than ordinary ice cream, if so why?

— Student question

What is the most ***toxic chemical*** you have worked with?

— Student question

Conversation in general

Common words in live chats

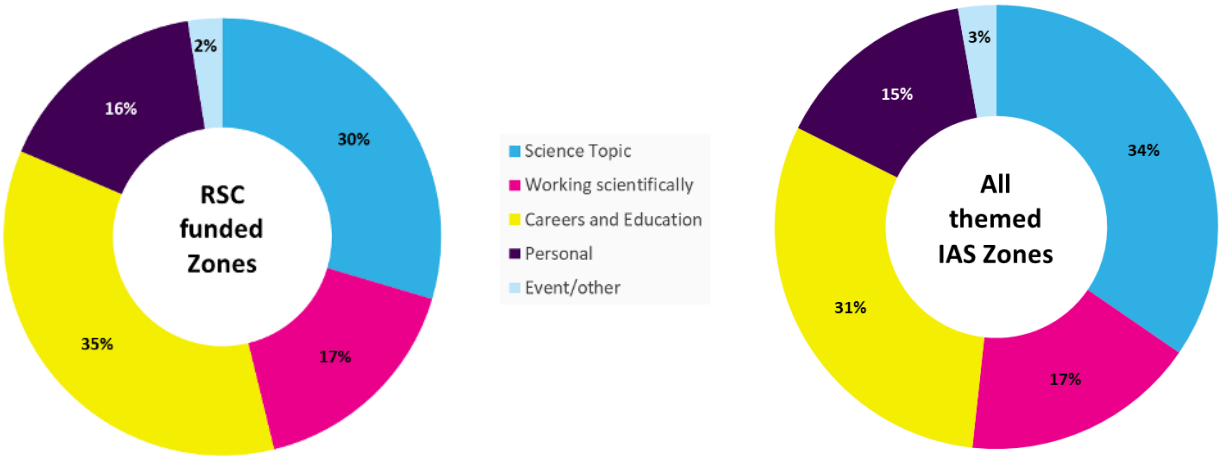
The images below show common words used in live chats. Size of the word is proportional to frequency of use.

Follow-up questions

Questions submitted by students are coded according to their theme. The charts below shows the proportion of questions in each theme.[8]

Topics of questions asked in chemistry zones were consistent with other IAS themed zones. The **majority** of questions were about **scientific topics** and **careers and education**.

Engagement with **chemistry topics** and careers was **present in both Ask and live chats.**



[8] From November 2017 to October 2021.

Impact

Scientists' feedback

The scientists who took part in chemistry zones from 2013 to 2021 were asked to complete a survey looking at the possible impacts of taking part in IAS.

65 out of 377 scientists responded to the survey.

Communication skills, understanding, and enthusiasm for public engagement

Scientists were asked what, if any, impact taking part in IAS had on their skills, confidence, and enthusiasm for communicating research with lay people.

The majority of respondents reported an increase in their **skills, confidence** and **enthusiasm** towards public engagement and communicating with lay people.

- **82%** of respondents reported an increase in **skill in communicating with lay people**.
- **80%** of respondents reported an increase in **enthusiasm for communicating with lay people.**
- **75%** of respondents felt as though their **confidence in communicating** with lay people increased.

> *I enjoyed this significantly more due to the chance to answer a range of questions I have never experienced before. It meant I had to think about what I was saying to a greater degree due to the fact that I was speaking to younger people and hoped to interest them in STEM.*
>
> **— Scientist, Feedback survey**

86% of scientists had increased their **understanding of young peoples' views** on science.

Additionally, scientists felt a **51%** increase in **enthusiasm for their area of research or work.**

> *Interacting with the kids was a very new experience. I learned how to make my work easy to understand for kids. It was a different experience as I had to re-think about my work on a very basic level.*
>
> **— Wajiha Bano, Scientist, Feedback survey**

This is the first public engagement event I have taken part in as a professional scientist and my enjoyment from it has encouraged me to sign up to take part in a mentoring program with the University of East Anglia (where I completed my MSc) that should start beginning of next year!

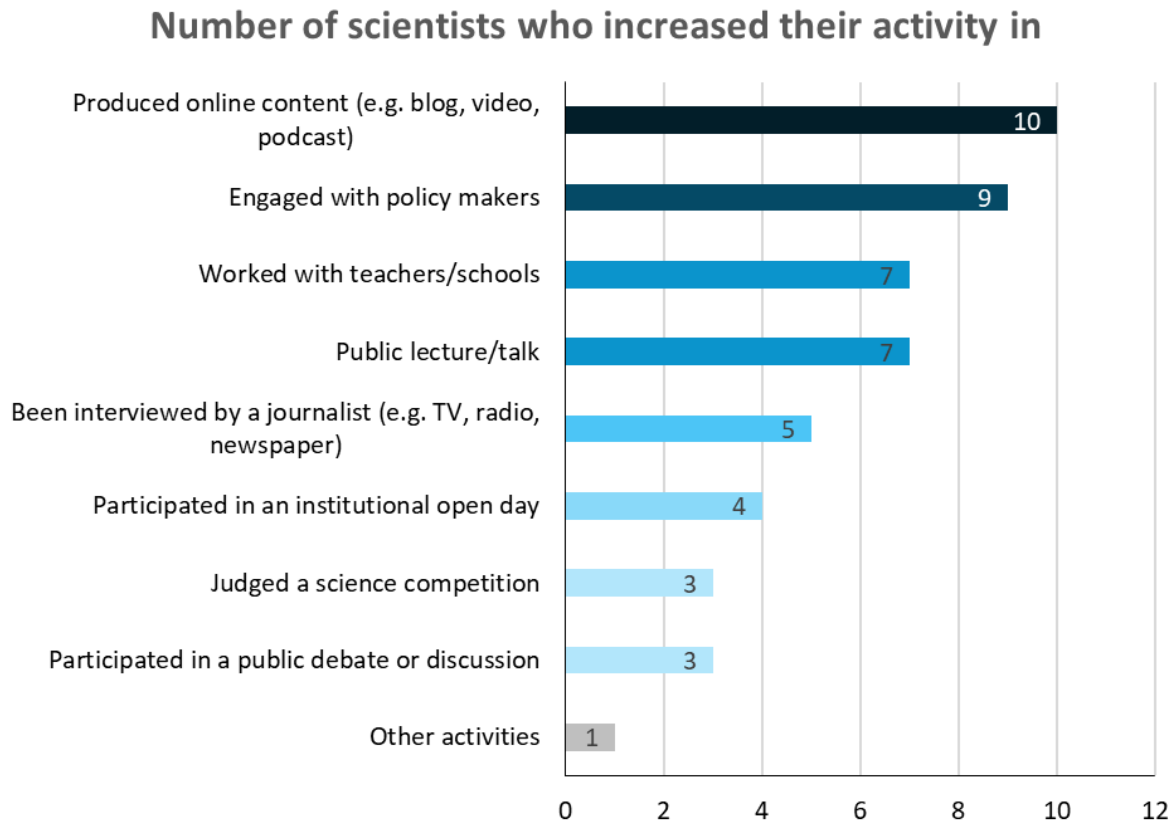
— Laura Durrant, Scientist, Feedback survey

Public engagement activity after IAS

Scientists taking part in the events were asked what, if any, public engagement activities they had taken part in, 12 months before and after IAS events.[9]

Prior to IAS, the majority of scientists had taken part in at least one public engagement activity, with only two not having taken part in any.

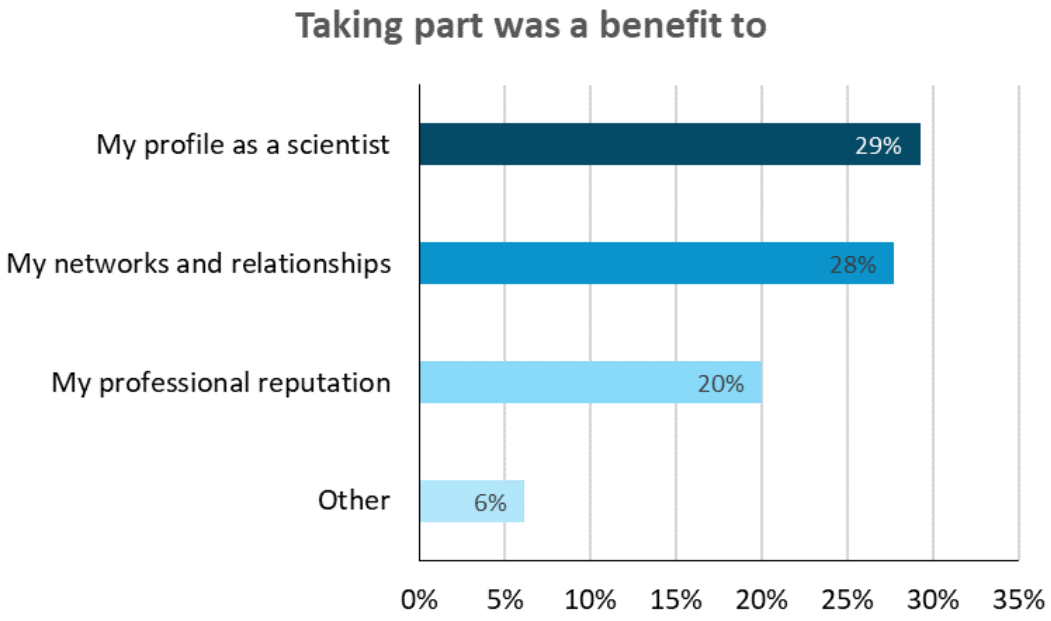
Participants reported a **71%** increase in interest for taking part in **further public engagement** activities following taking part in IAS.



[9] Exception: scientists of 2021 zones

Professional advantages

When asked what benefits they perceived from having taken part in IAS, **77%** of scientists felt there had been a **benefit to their professional profile, reputation, and** extended their **outreach and academic network and relationship**s.



Further participant feedback

I enjoyed the text based nature of it as I have a stammer so it makes it harder to engage with strangers through speech.

— Edward Smart, Scientist, Feedback survey

It was a very relaxed platform, with way more student engagement than anticipated! The live chats especially provided students with a fun opportunity to ask lots of questions - more than I ever got during any in-person event, and express their curiosity about all things science.

— Scientist, Feedback survey

I'd recommend that every scientist should try this and find out how younger members of the public view us!

— Martin McCoustra, Scientist, Feedback survey

I'd never taken part in an online public engagement event before, so this was the greatest change. I enjoyed having direct contact with the students, and them feeling like they have free reign in where they take the discussion.

— Kate, Scientist, Feedback survey

Supporting Science Capital

I'm a Scientist, Supporting Science Capital

In 2019 Jen DeWitt, PhD, an independent research and evaluation consultant, and member of the core team developing and applying the concept of science capital, conducted an evaluation of IAS to see how the experience might support students' science capital.

The research comprised student focus groups, teacher interviews, surveys and analysis of content generated on the IAS site including transcripts of live chats and questions asked by students.

The evidence produced by this research demonstrates that the experience of IAS maps onto elements of the Science Capital Teaching Approach. In turn, this supports science capital-related outcomes of participating in IAS.

The research discussed in the following section applies to the IAS project as a whole.

Read the full report (PDF):
about.imascientist.org.uk/files/2019/11/IAS-Science-Capital-Main-Report-Sep-2019.pdf

Background: Science capital

Science capital[10] is a set of resources that helps individuals engage and identify with science. Young people with higher levels of science capital are more likely to see science as 'for me' and to choose to study science subjects at a higher level.

The Science Capital Teaching Approach (Godec, King, & Archer, 2017)[11] aims to enhance young people's engagement with science, supporting them in seeing science as relevant to their lives and 'for me'.

The foundation of this approach involves broadening what counts in the science classroom: creating a learning environment where all students feel able to offer contributions from their own experiences and interests. The approach also consists of three main pillars:

1. **Personalising and localising:** Going beyond contextualising, to connect to the actual experiences, understandings, attitudes and interests of young people.

[10] ucl.ac.uk/ioe/departments-and-centres/departments/education-practice-and-society/science-capital-research
[11] discovery.ucl.ac.uk/id/eprint/10080166/

2. **Eliciting-valuing-linking:** Inviting students to share knowledge, attitudes and experiences; recognising these as having value; and connecting this back to the science.
3. **Building the dimensions of science capital:** Considering the eight dimensions when developing activities, lessons or programmes.

Supporting science capital

The research found evidence that IAS provides support for four of the science capital 'dimensions':

- **Science literacy** (Dimension 1)
- **Seeing science as relevant to everyday life** (Dimension 2)
- **Knowledge about the transferability of science/science qualifications** (Dimension 3)
- **Knowing people in science-related jobs** (Dimension 7)

Science literacy (Dimension 1)

By providing the opportunity to ask about science content, taking part in IAS contributes to science literacy.

Seeing science as relevant to everyday life (Dimension 2)

Because students can ask questions of interest to them personally, taking part in IAS can enhance science-related attitudes and values, helping students to see science as relevant to their everyday lives.

Knowledge about the transferability of science (skills, knowledge, qualifications) (Dimension 3)

When students ask about qualifications, participation may improve their knowledge of the range of jobs that science can lead to.

Knowing people in science-related jobs (Dimension 7)

Most importantly, however, IAS provides an opportunity to get to know scientists — about the paths they took to their current work, about a range of aspects of their work (e.g. travel, teamwork) and about their lives outside of work. Students may even discover that scientists are not all 'super geniuses' — that they are normal individuals, albeit with interesting jobs.

In sum, IAS is personally relevant to students and their lives, elicits and values students' questions and experiences, and provides support for building dimensions of science capital. Together, its various elements create an environment in which students are able to contribute from their own interests and experiences.

Consequently, through participating in IAS, students can come to see science as personally relevant to them and to appreciate that scientists are 'normal people'. Moreover, ultimately it is the participating students who are in control — it is their votes that determine the winner.

This environment, we believe, reinforces that the arena of *I'm a Scientist* is one in which it is students' valued and valuable opinions that count the most. Together, then, the elements of IAS can support students' science capital, meaning IAS has an important role in helping young people see that science just might be 'for me' which, in turn, can contribute to nurturing science aspirations.

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