I'm a Scientist Get me out of here

**A science dialogue event for schools,
developed by Gallomanor and funded by the Wellcome Trust**

Students engage with real scientists and learn about real science

Scientists

"I think it engaged the kids in a way I've never seen before."

"I am now excited about my work again! I also FINALLY managed to explain my work to my Dad in a way that he understood!"

Students

"Really great fun some new info to add to our ever growing brains =]"

"It gave you an insight into what being a scientist is really like."

Teachers

"The pupils were looking forward to their science lessons, asking about them in the corridor etc."

"It has got [students] to see that things aren't black and white."

"…realisation that [scientists] are real people with lives, interests and senses of humour."

"They didn't seem to think of it as work."

"It was an eye-opener for me that you can teach like that and trust them to find things out for themselves."

"It really promoted higher thinking skills."

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"I'm a Scientist, Get me out of Here!" Event Evaluation report

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One-page Summary

I'm a Scientist, Get me out of Here! is a science dialogue event where school students talk to real scientists online and vote for the one they want to get a prize of £500.

The pilot event has been kindly funded through a People Awards grant from The Wellcome Trust.

Headline statistics

Dates	16th – 27th June 2008
Classes	40
Registered users	851
Questions asked	1,288
Log ins	2,882
Page views	80,091
Total visits	5,124 visits by 2,675 unique visitors
Average visit	15.63 pages viewed during 14:27 minutes on the site

Students said: "i learnt loads and feel much more confident to put my hand up and ask questions and know that ok sometimes i will get it wrong"

Teachers said: "The pupils were looking forward to their science lessons, asking about them in the corridor etc."

Scientists said: "It engaged the kids in a way I've never seen before."

Every scientist and teacher surveyed said they would recommend it to a colleague.

Key Outcomes

- Students realised scientists are real, interesting, fun people
- Students were inspired and enthused
- Developed debate and discussion and How Science Works (HSW) skills

Key reasons it worked

- Giving some power to young people gives them a reason to engage and shows that they are trusted
- The fact that it's real – real scientists, real science, real prize money – makes it far more vivid
- The intimacy of the medium makes it easier to break down barriers and make connections

Who took part?

- 40 classes in 25 schools across the UK, covering different exam boards, types of schools and ability levels.
- 725 students were pre-16 (mostly year 9s), 130 were post-16 (mostly year 12)
- 15 scientists from PhD students to Professors, from academia, research institutes, hospitals, and industry.
- Scientists' research areas included drug development, plant metabolism, bio-engineering, climate change and the psychology of driver behaviour.

Executive Summary

The event

I'm a Scientist is a science dialogue event where school students talk to real scientists online for two weeks. It's in the form of an X Factor style competition between scientists, who compete for a prize of £500 to communicate their work.

For two weeks students read about the scientists' work, ask them questions, and engage in live text chats with them. The students vote for the scientist they want to get the money. The scientists with the fewest votes are evicted until only one is left to be crowned the winner.

The event consists of the event website, and accompanying teacher resources. Taken together these:

1. Gave them a **reason to engage** (because they had a decision to make, in casting their vote, and real scientists to talk to)
2. **Led** students through the issues
3. **Guided** students through how to debate and discuss the issues
4. Gave them lots of **practice** in debating, discussing and making decisions

Resources include

- Lesson plans which raise and frame the issues (such as thinking about what criteria to judge scientists by)
- Lesson plans and resources which cultivate debating and discussion skills (like the IVF debate)
- Information sheets which tackle contentious issues in science, and introduce complex concepts in How Science Works (HSW), but in a context that makes them accessible
- Quizzes (both online and offline) which help to test understanding

Students

- Developed their debating and discussion skills
- Learnt about How Science Works
- Saw science and scientists as 'real'
- Were empowered and gained confidence
- Were inspired and enthused

Scientists

- Were inspired and energised about their work
- Practised communicating their research
- Practised discussing the ethical implications of their work
- Had fun!

Teachers

- Found it saved them lots of work
- Found it an effective tool for teaching How Science Works
- Had fun and enthused their students

Development of the event

The event has been developed with the kind assistance of a People Awards grant from The Wellcome Trust and was based on our tried and tested local democracy event, I'm a Councillor, Get me out of Here!

Formative evaluation included a consultation panel of teachers, focus groups at the start of the event, and an educational advisor throughout the event. We consulted the panel throughout the process, so that all resources, terminology, etc were checked with working teachers - this was particularly useful.

Outcomes

The event was far **busier** and **more successful** than we anticipated. Although slightly fewer students than we hoped took part, they asked far more questions and used the website far more than expected. Feedback from young people, teachers and scientists has been **overwhelmingly positive**.

31% of students went on the site in their own time, at home.

Every single teacher surveyed would use the event again.

Every single scientist who took part would recommend the event to a colleague.

Students developed their debating and discussion skills
The event was effective because it showed students how to discuss and debate science issues by giving them a structured way in which to do it. It also gave students a reason to engage with the issues, and lots of practice at doing so.

60% of students surveyed said they felt more confident or much more confident at debating science issues.

17 out of 22 teachers surveyed think their students feel more able to debate and discuss science issues.

"The IVF debate went on for two lessons and they started defending their viewpoints which they wouldn't have done before. They also began to see all sides of the argument rather than have a blinkered approach."

Rachel Cockburn, teacher, Hetton School

Teachers realised this opportunity to debate and discuss issues was usually lacking, but that it's essential to really get to grips with ideas and develop critical thinking skills.

"[Usually] we just fill them full of facts but don't give them a chance to explore that."

Kirsty Price, teacher, Sherwood Hall School

Students learnt about How Science Works
Targeted resources and the opportunity to interact with real science and see ideas in action was a very effective tool for teaching How Science Works.

88% of students surveyed said their understanding of what scientists do is better or much better than before.

18 out of 22 teachers surveyed said the event was "Excellent" or "Good" at teaching How Science Works.

"If there's one key thing I would say about the event, it's that it has got them to see that things aren't black and white. And that's the essence of HSW."

Jay Grocott, teacher, Mangotsfield School

Students could see science and scientists as real

Talking to real scientists brought science to life and gave students a reason to engage with abstract HSW ideas. This made their learning much deeper. It also showed them that scientists are normal people and helped students get beyond stereotypes.

"In textbooks it will present a character and say, 'Samira works on a farm…' but you know it's not real so you just don't care. This was different."

Dan Hannard, teacher, Woodkirk High School, Wakefield

"What struck them was that the scientists were all really different, there wasn't a stereotype."

Pam Large, teacher, Sacred Heart High School

"The kids don't usually get a chance to talk to someone who's looked at the data [on climate change]. They were sceptical to start with but most of them were won over when they heard the evidence."

Jenny Barnes, scientist

It built students' confidence

What's key, memorable and effective about the event is the way it gives students a say, and the fact that they are **taken seriously** by scientists who answered their questions. This was empowering for students and developed their confidence.

15 out of 22 teachers felt their students are more confident in their opinions now.

"[I liked best] how it was totaly up to us and not influenced by adults."

Year 9 student, Ysgol Tre-Gib

"Well [I learnt] from all of it really as i learnt loads and feel much more confident to put my hand up and ask questions and know that ok sometimes i will get it wrong"

Year 9 student, Hetton School

It was fun!

92% of students surveyed said they liked the format of the project.

"i liked everything about this website and i would recomend it to a friend who enjoyed doing science this is a fun way to work!"

Year 9 student, Hetton School

"I think this was probably the best science engagement event that I have ever been involved with."

Liv Hibbit, scientist

"Absolutely fantastic! I was ranting to my colleagues about how great it was and they were all jealous"

Michelle Crooks, teacher, King Arthur's Community School

Scientists
Found that it was excellent training in explaining their work and considering the wider implications. They also found it fun, and a **unique depth and breadth of engagement**.

> "I am now excited about my work again!! I also FINALLY managed to explain my work to my Dad in a way that he understood!!!"
>
> *Liv Hibbit*

> "It really made me think about what I do and why."
>
> *Maria Tennant*

> "How else could you have almost one on one contact with so many young people, all over the country?"
>
> *Sam Mugford*

1 Summative evaluation

1.1 Effect on participants: have the outcomes been achieved?

What did people get out of taking part in I'm a Scientist? In this section we discuss, in turn, the outcomes for all three groups of participants: young people, scientists and teachers.

This section is mainly based on feedback survey responses from young people, scientists and teachers, and also the in-depth interviews conducted by external evaluator Yvonne Harris and project producer Sophia Collins.

We then include a discussion of some of the interaction on the website, with examples of the kind of questions asked and of constructive discussion of controversial issues.

Participant input

- **Student feedback questionnaires from 143 students**
  (out of 945 users, 17% return rate)
- **Teacher feedback questionnaires from 22 teachers**
  (out of 34 teachers taking part, 65% return rate)
- **Scientist feedback questionnaires from 15 scientists**
  (100% return rate)
- **Interviews with 12 teachers**
  (six by Sophia Collins, project producer and six by Yvonne Harris, external evaluator)
- **Interviews with eight scientists**
  (five by Sophia Collins, project producer and three by Yvonne Harris, external evaluator)
- **Content generated by users on the website**
  (questions asked, live chat transcripts)
- **Informal feedback (eg emails) by project participants**.

1.1.1 Summary of findings

We found that the event:

For students

- **Deepened** students' understanding of science, what scientists do, and How Science Works (HSW)
- Made students **excited** about science and **inspired** their interest in it
- **Empowered** students and made them feel a personal stake in science and therefore engage in a deeper way
- Developed students' ability to **debate and discuss** science issues and see other sides.
- Made scientists seem like real, interesting people to students

(More details on page 10.)

For teachers

- Made teachers' lives **easier**
- Developed teachers' confidence at **teaching more flexibly** and encouraging more debate and discussion
- Helped teachers **get to know** their students better

(More details on page 21.)

For scientists

- **Engaged** and **enthused** scientists
- Got them thinking about their work in **different ways**
- Developed scientists' **ability to communicate** their work

(More details on page 27.)

And everyone had fun!

> "They worked really hard during this event, but they didn't seem to think of it as work."
>
> *Liz Howell, teacher, Ysgol Tre-Gib*

The event was really tested in this pilot. These were not all high-performing selective grammar schools. Any project can look successful if you only include the most committed and supported students. We included as broad a range as we could. We found that even less academic schools, lower ability classes, and students at a special school, found that the event worked for them.

Students were engaged and developed skills. Complex ideas were communicated. Students learnt without realising how much they were learning. Sometimes teachers taught without realising how much they were teaching. **Even teachers who'd had the event dumped on them by someone else at the last minute were raving about it by the end**. I'm a Scientist works at inspiring students, teaching How Science Works (HSW) and developing their skills.

1.1.2 What did students get out of it?

The key aims for the event were that, for young people, it would:

- Bring science and scientists to life
- Be empowering
- Be inspiring and fun
- Improve their debate and discussion skills

92% of students (109 out of 119) liked the format of the project.

31% of students (44 out of 138) used the website at home, in their own time, after having been introduced to it at school.

88% of students (122 out of 139) said they understood "what scientists do" better or much better since taking part in the event.

Scientists become more 'human' and science careers become more achievable

*Talking to a range of real scientists challenged stereotypes and made scientists seem human. One important consequence of this is that it **made becoming a scientist seem achievable** and gave students more understanding of the range of science careers available.*

19 out of 22 teachers surveyed thought that their students now have a more positive view of science.

"What struck them was that the scientists were all really different, there wasn't a stereotype."

Pam Large, teacher, Sacred Heart High School

"who knew they were real people with lives and didnt spend the whole day cooped up in a lab! ha, no ofcourse i never thought that"

Year 9 student, Valentines High School

Students really **identified** with the scientists they spoke to.

"Jenny was the only one whose cause was the best as she was trying to help under developed countries who are in a despairing state. The reasearch was also quite convincing and she was a lovely person. most definately deserved to win!"

Year 9 student, Valentines High School

"IAN rules!"

Year 9 student, Mangotsfield School

Sally Fox, from Heanor Gate School, explained that it made her students think about what scientists actually do, rather than just an abstract concept of 'doing science'. It gave them a far more visceral understanding of what scientists actually do.

"It gave you an insight into what being a scientist is really like."

Year 9 student, St Laurence School

> "They found out about what scientists actually do all day – that Liv had spilt bacteria down her trousers, or that Nick spends most of his time on his computer, sending emails or waiting for it to process calculations."
>
> *Dan Hannard, teacher, Woodkirk High School*

> "It really, really helped them to see the day-to-day life of scientists – including that some of it is repetitive and boring. And that they are real people who get up and go to work, and do other stuff to."
>
> *Sarah Gettings, teacher, Acklam Grange School*

This helped students to see scientists not as rarefied beings, but as normal people like them.

> "…insight into what scientists actually do and empathy with them - realisation that 'they' are real people with lives, interests and senses of humour"
>
> *Janine Killough, teacher, Valentines High School*

Case study – controversial issues: Animal testing

> "The students really got into the projects, especially debates surrounding animal testing."
>
> *Emma James, teacher, St Laurence School*

One controversial topic that came up frequently was animal testing, particularly with scientists (like Tamsin Langley) who do test on animals. Students asked dozens of questions about it, and it was mentioned by almost every class in live chat. Many pupils had strong, emotive, views on the subject, but were often not well informed about what it entails, what regulation there is, or why scientists do it.

You could see their opinions become **more considered and nuanced** during the event. This was because students were using their growing discussion skills and finding out more from informed scientists who would answer their questions.

Students started off with "Do you test on animals? I think it's cruel", but then other questions would come out, "Why do you test on animals? Do you have to or do you choose to?", "Are the animals looked after well? Have u ever tested on any other animals?", "Tamsin, how do you know that if you do an experiment on rats wether it will have a different effect on humans?"

> "Many of our pupils were totally against all animal testing. Through the "you're the judges" lesson where the criteria were selected through a class debate, they accepted that while animal testing is not ideal it is a valuable part of some research. The key point was they made that decision after a reasoned debate, even though it was difficult to change their minds on such a strongly held view."
>
> *Janet Harland, teacher, Hetton School*

> "At first I was really against [animal testing], but now Im not so sure."
>
> *Year 9 student, Acklam Grange School*

This familiarity with the day-to-day of science and scientists is very **powerful**. It shows students that science is approachable and is an integral human activity and not boffins in Ivory Towers. Most young people are not going to grow up to be scientists, but all of them will grow up to be citizens, voters, consumers and patients.

> "[The students have gained] more of an idea about the wider aspects if Science and what it covers, and what they can do with their science qualifications. We now have several students who have totally been inspired by the scientists involved!"
>
> *Janet Harland, teacher, Hetton School*

Furthermore, showing the scientists as real people made them both approachable and human, and also people to possibly emulate.

Kirsty Price told us that some of her students are now keen on the idea of working in science, "They can see that there are other options out there than being a nurse or a policeman, and scientists aren't all Albert Einstein."

> "i want to be a scientist now"
>
> *Year 9 student, Addey and Stanhope School*

Science made real

Because students are talking to real scientists who are doing new research now, students care more and take what they are learning more seriously. They also get an insight into what the practice of science really is, which academic exercises cannot give.

88% of students surveyed said their understanding of what scientists do is better or much better than before.

58% of students surveyed said their understanding of How Science Works is better or much better than before.

15 out of 20 teachers surveyed said that their students now have a more nuanced view of science.

Teachers kept referring to how **real** the event was and the value of this.

> "So much stuff we do with them in school is made up, in this they were making real decisions about real scientists."
>
> *Jay Grocott, teacher, Mangotsfield School, Bristol*

> "In textbooks it will present a character and say, 'Samira works on a farm…' but you know it's not real so you just don't care. This was different.'
>
> *Dan Hannard, teacher, Woodkirk High School, Wakefield*

By engaging with real, ongoing science, students start to understand that science is a process and a way of investigating the world; that science is not the facts it produces (useful though those are). Students also understand that science is ongoing, whereas sometimes textbooks can leave students feeling that science is about its history. And they understand more about the realities of modern science.

Some examples from teachers of what that meant, practically, for students' understanding:

"[My students gained] improved awareness of scientific funding, issues in research."

Chris Millington, teacher, Longsands College

"Insight into the work of scientists"

Mairead Ulamoleka, teacher, Oak Lodge Special School, East Finchley

"…an understanding that science is now not just in the past."

Kelly Hearn, Advanced Skills Teacher, John of Gaunt School

Empowering

It is empowering and confidence building for students to be talking to real scientists and making a real decision. This had a positive effect on their science skills and on their engagement with science and with the issues.

15 out of 22 teachers felt their students are more confident in their opinions now.

"good all round and good confidence giver to ask anyone anything"

Year 9 student, Mangotsfield School

Young people really appreciated that they had some power.

"I liked the fact that… we had control of who we would like to win."

Year 9 student, Heanor Gate School

"[I liked best] how it was totaly up to us and not influenced by adults."

Year 9 student, Ysgol Tre-Gib

Also important was the fact that they were being **taken seriously** by outside adults – scientists, no less!

"[I liked] the way that no matter the question they would answer it seriously with their own opinion."

Year 10 student, Bury St Edmonds School

"At first they just didn't believe that real live scientists were talking to them and answering their questions. Some kids were going out and looking up science questions to ask them to see if they could catch them out."

Kirsty Price, teacher, Sherwood Hall School, Mansfield

This made young people feel special, Janine Killough, Valentines High School, said, "One girl literally couldn't believe that there was really a person answering the Qs, 'like, right now?!!'"

This particularly developed quieter students. Michelle Crooks told us how some quieter students became **more confident** online and she was surprised by how strong their opinions were. One girl in particular is very shy but talked a lot in chat. "It's had a big effect on her that the scientists were taking her seriously and answering her questions."

Debate and discussion - did it work?

One of the central aims of the event was to help develop students' debating and discussion skills. These skills are developed through giving students a reason to engage, ***modelling*** *what to do, and giving them lots of practice debating real issues. Please see text box for further background and explanation.*

69 of 114 students (60%) surveyed said they felt more confident or much more confident at debating science issues.

17 out of 22 teachers surveyed think their students feel more able to debate and discuss science issues.

"Well [I learnt] from all of it really as i learnt loads and feel much more confident to put my hand up and ask questions and know that ok sometimes i will get it wrong"

Year 9 student, Hetton Schoool

"Now when i am explaining a topic they ask 'Why' a lot more and put their own point across."

Emma James, teacher, St Laurence School, Bradford on Avon

"The IVF debate went on for two lessons and they started defending their viewpoints which they wouldn't have done before. They also began to see all sides of the argument rather than have a blinkered approach."

Rachel Cockburn, teacher, Hetton School, Sunderland

Case study on the IVF debate

Sarah Gettings, of Acklam Grange School in Middlesbrough had done a course two years ago on using discussion in the classroom, but still didn't use it much. She felt attempted discussions often didn't work well – students didn't know where to start. The IVF debate gave a structure, which made it much easier for her and the students to run a debate.

At first students were confused, "We don't understand, how can there be no right answer?", but it really developed them. Students started putting forward their opinions, and justifying them with evidence.

After being 'trained' with the IVF debate, they had a lesson on the different scientists. Students discussed the scientists' work, the implications and which they thought was most important. Sarah felt this discussion was **fascinating and surprisingly wide-ranging** and gave her new insights into her students, many of whom surprised her with the strength of their opinions.

"I don't think we give enough time in school to them exploring their own ideas and opinions." Sarah thinks it would be really handy to do a debate like the IVF one with them every half term.

Kirsty Price told us in more depth what this meant in her classroom. She said that usually "we just fill them full of facts but don't give them a chance to explore that."

She felt that in the IAS exercises, instead of just being based on learning facts, students had to come out with opinions and back that up with evidence. "It really promoted higher thinking skills" and was good preparation for GCSE for her year 9s.

"It definitely increased their debating and discussion skills. But also increased my confidence in doing those activities with them… I realised you can't just expect kids to come up with an opinion and back it up straight away." For example, the 'You're the Judges' exercise gave them a place to start from and a reason for doing it, and the IVF debate modelled what they should do.

Kirsty felt that you got debating and discussion with every part of the event, all building those skills together. "It was very clearly laid out, but at first all the lesson plans and activities were a bit confusing, they all seemed different. But as it went along it got clearer and I could really see how they worked together."

Debate and discussion - explanation

> "Tell me and I'll forget; show me and I may remember; involve me and I'll understand."
>
> *Chinese proverb*

Being able to debate and discuss science issues is a key area of the 21st Century Science/How Science Works agenda and a crucial skill to nurture for an informed and involved public in years to come. The central fact of the event is students interacting with real scientists, and voting. This naturally promotes debate and discussion skills; partly because students have been entrusted with a decision, which gives them a reason to engage, and partly because the event gives them the opportunity and the forum to do so.

We also carefully designed the accompanying resources to draw out and develop these skills and work in concert with the online event. Teachers told us frequently during the development research, and in the event feedback, how they find this a difficult set of skills to teach their students. There's a dearth of good quality debate and discussion resources. Also, science teachers themselves haven't always had a lot of training in using debate and discussion in the classroom, and the students aren't used to doing it.

This is how the resources and the event worked together

1. "You're the Judges" **led** students through thinking about the decision they faced and drew out the issues.
2. "IVF debate" **modelled** debate and discussion in a structured way.
3. Interaction with scientists and voting gave students **practice** at using these skills and a **reason to engage**.
4. Other accompanying resources **extended** this further, **raised different HSW issues**, and gave more opportunities for **practice**.

Many teachers mentioned that they realised they should do more discussion activities. "We don't give enough space for that in school." And IAS really helped students to start to do that.

> "They are much more willing/quicker to give their views on science issues [since the event] - we had a chat about cosmetic surgery in class - not a planned debate, it just came up as part of the lesson - and lots of them had well thought out view on the topic. I don't think they would have been so ready to engage in discussion before this event."
>
> *Liz Howell, teacher, Ysgol Tre-gib, Llandeilo*

Liz felt that IAS had made her students more vocal, but that they had also learned to better **structure their thoughts** and think in a more analytical way about science issues. Teachers have continually reported students having a better ability to see other sides, to back up their opinion and more confidence in their own opinions.

> "Other teachers have reported hearing the pupils voice their opinions on science issues outside the science room."
>
> *Mairead Ulamoleka, teacher, Oak Lodge Special School, East Finchley*

Our resources

Lesson 1: You're the Judges
This led students through thinking about the issues
'You're the Judges' was a preparation activity for deciding which scientist to vote for. We gave the class a list of hypothetical statements by scientists ("My conclusions are based on lots of accurate data", "I am very good looking"). Students had to decide which would be important in judging the scientists. This led students to explore the question of what makes a good scientist, with a practical reason for taking the ideas seriously. This also resulted in them having a well-thought out set of criteria to apply, *which they felt ownership of*.

Lesson 2: IVF debate
This modelled debate and discussion in a structured way.
This was a role play where students were given different character cards with a short background and position in the debate. They also had a fact, an issue and a question. Students had to read out the first part of the card initially, then discuss. After this there were three more 'rounds' where they read out their fact and their issue, then addressed their question to the other character of their choice. Further discussion could happen at each round.

Information sheets
These covered substantive areas of the curriculum (ie subject knowledge), while also covering HSW areas too. So the Nuclear Power info sheet was also about the difference between facts and opinions, the Pesticides/Data handling info sheet was also about 'a fair test' and reliability vs validity of results, and the Drug Development info sheet was also about publication bias and the existence of bias in science.

1.1.3 What did teachers get out of it?

Teachers' responses were overwhelmingly positive. All survey results based on teacher feedback questionnaires from 22 teachers (out of 34 teachers taking part, 65% return rate).

22 out of 22 teachers surveyed said they would participate again.

22 out of 22 teachers surveyed said they would recommend the event to a colleague.

"Absolutely fantastic! I was ranting to my colleagues about how great it was and they were all jealous."

Michelle Crooks, teacher, King Arthur's School

Our intended outcomes for teachers were:

- The event should work well, 'straight out of the box', creating little extra work for teachers.
- It should be an effective way of teaching science and society and How Science Works aspects of the curriculum.
- The young people should find it fun, memorable and involving.

We feel these expectations were more than met, and that it had other positive outcomes too, which we'll discuss later.

Straight out of the box'?

*Most teachers told us that the resources worked straight away, they didn't have to change anything, and that this gave them **more time for actually teaching**.*

78% of teachers said that the event was "Excellent" or "Good" at making life easier for the teacher.

"Often resources will need lots of tweaking, or you've got to find lots of stuff yourself. IAS stuff was well planned and the lessons really worked."

Dan Hannard, teacher, Woodkirk High School

"Little planning time for me."

Kelly Hearn, Advanced Skills Teacher, John of Gaunt School

"Well developed/researched resources they were excellent!!!"

Helen Mitchell, teacher, Heanor Gate Science College

"The experience let me teach my students in a different way. The type of teaching was very different to what I am used to as I have to work to a rigid scheme and this has to be delivered in a set time scale so I often feel quite rushed! This experience allowed me to deliver lessons in a more laid back style as it was so well resourced"

Michelle Crooks, teacher, King Arthur's School

Michelle wasn't the only teacher who found that the event and resources freed them up to actually engage with pupils and develop a more positive relationship with the class.

> "Having resources provided, and having students interact with a third party meant I could concentrate on facilitating rather than teaching."
>
> *Lynn McCarroll, teacher, Riverside College Halton*

This wasn't the case for all teachers. One or two found it still took planning time.

> "In terms of making my life easier, it actually took a fair bit of time to get my head round the resources - not that they weren't well-planned and organised, but to be confident with them, it took a similar amount of planning time as a regular lesson."
>
> *Janine Killough, teacher, Valentines High School*

This is perhaps something we can't do much about, given the originality of the activities. But we will give some thought to clarifying the teacher information. We'll put together an extract of teacher feedback and this evaluation for future teachers taking part, which will hopefully help better illustrate how it all works.

We provided **differentiated resources**, including pre-16 'foundation' and 'extension' versions, and post-16 versions, of all info sheets. We also gave 'Support' and 'Extension' suggested adaptations of all lesson plans. But some teachers found that some things were still too advanced for their students.

> "I had to check through the information to make it more accessible to my pupils. The students needed a lot of adult support to take part. It certainly didn't make my live easier but it was well worth it."
>
> *Mairead Ulamoleka, teacher, Oak Lodge Special School, East Finchley*

It's difficult to provide resources which cover the entire ability range, especially if including students with severe special educational needs. However, we were extremely pleased to have a special school take part, and get so much out of it. We will provide simpler 'support' versions of info sheets for future events.

> "I would cut down the text. I had a low ability group who struggled to cope with the sheer volume of information. The differentiation in the teacher pack was great, but the content on the website was not."
>
> *James Culliford, teacher, St Laurence School*

We accept that differentiated classroom resources don't fully address the needs of low literacy groups, when accessing the website, but the website has to be 'one size fits all'. This teacher unfortunately did not have much time available to run the event with his class and therefore was not able to run lesson 1 (You're the Judges) or lesson 3 (Meet the Scientists) before going online.

We do feel that if this class had been able to absorb the scientist information at their own pace more (by doing the 'Meet the Scientist' lesson in class, using the printer-friendly versions of the scientist project briefs which we provided), then perhaps their visit to the website might have been less overwhelming. That was the purpose of the lesson, to take students through discovering it all step-by-step.

However, we don't expect all teachers to have the time to do all lessons, and if we haven't made clear enough how to make things easier for pupils, then that is our failing. Also, one or two other teachers commented that low literacy students found the website, or following the live chats, difficult.

One addition we will make next year is to have a short, summarised 'Scientist CV' on the main scientist project brief page. And we will look at ways to better structure the Q+A and live chat pages. We would also like to include more scientist photos and perhaps short video clips, as many low literacy students find audio and visual information easier to process. Given that video may be technically difficult, both for our end and for school systems, and that it would involve considerable extra work for scientists, this is a 'nice to have', rather than something we can guarantee.

On the whole, teachers found the resources and the event well-structured and resourced and that it worked well with little further input from them. A small number raised areas of concern, and we have described ways we intend to address these.

Effective at teaching How Science Works?

Teachers told us that many How Science Works skills are difficult to teach and they find there is a lack of effective resources. They found I'm a Scientist got across difficult concepts effectively.

18 out of 22 teachers surveyed said the event was "Excellent" or "Good" at teaching How Science Works.

15 out of 20 teachers surveyed think their students now have a more nuanced view of science.

"If there's one key thing I would say about the event, it's that it has got them to see that **things aren't black and white**. And that's the essence of HSW."

Jay Grocott, teacher, Mangotsfield School, Bristol

17 out of 22 teachers surveyed think their students feel more able to debate and discuss science issues.

"The event encouraged discussion about so many different aspects of science. Some of the pupils got quite **passionate** about their views."

Danielle Fox, teacher, Winterhill School

15 out of 22 teachers surveyed have seen evidence that their students are more confident in their opinions.

88% of students surveyed said they understood 'what scientists do' better or much better.

58% of students surveyed said they understood 'how science works' better or much better.

"It helped me to put a whole new spin on teaching How Science Works."

Sarah Gettings, teacher, Acklam Grange School

"This group is hungry for knowledge and it can be difficult to enthuse them with the routine curriculum stuff. This was something new and different, both in its content and its mode of delivery (online) and they really got into it."

Liz Howell, teacher, Ysgol Tre-Gib

"I also thought the activities were brilliant to get them thinking about HSW and they fed this back to me."

Danielle Fox, teacher, Winterhill School

In fact, so well integrated were the HSW issues that teachers were teaching more than they realised!

> "My only fear is that the curriculum was not covered but having moved through my teaching I am finding that some topics have be covered and in a huge amount of detail better than I would have managed in a normal lesson!"
>
> *Michelle Crooks, teacher, King Arthur's School*

Fun, involving and memorable for students?

Teachers found the event engaged and enthused their students about science and their science lessons.

19 out of 22 teachers surveyed said the event was 'excellent' or 'good' at inspiring and engaging students.

92% of students surveyed liked the format of the project.

31% of students surveyed went on the website at home, in their own time.

> "Students **having fun** in a science context."
>
> *Dan Hannard, teacher, Woodkirk High School*

> "Enthusiastic pupils arriving to science lessons."
>
> *Mairead Ulamoleka, teacher, Oak Lodge Special School, East Finchley*

> "it made the science lessons more fun"
>
> *Year 9 student, St Laurence School*

> "The students came into lessons with a buzz, and in the computer room they were enthusiastic about responses to their questions and wanted to tell me about them."
>
> *Lynn McCarroll, teacher, Riverside College Halton*

> "It also made them realise that scientists were a vibrant and fun crowd who they could relate to. Fantastic to have such a bright crowd of interesting people for the students to have a dialogue with."
>
> *Becky Parker, teacher, Simon Langton Grammar School for Boys*

The fact that lessons were fun had a positive effect on learning.

> "They worked really hard during this event, but they didn't seem to think of it as work. They learned a lot - they are a really bright group and they just soaked up the whole experience."
>
> *Liz Howell, teacher, Ysgol Tre-Gib*

You might expect committed teachers who'd gone to the trouble of volunteering for a pilot of this nature to be enthusiastic. But one or two teachers had been volunteered by others – for example when a head of science applied for several classes at their school, or in one case, where a teacher about to go on maternity leave volunteered her successor. Were teachers who hadn't bought into the project themselves equally convinced?

"Exceeded [my expectations]. Pupils more receptive than I thought they'd be (oh ye of little faith!) thank to all involved and Ian was a popular winner with his pupils!"

Dave Perryman, maternity leave replacement teacher at Bristol Hospital Education Service

Unexpected outcomes: professional development for teachers

Something that came through very clearly in the evaluation, but which we had not specified as a possible outcome, was that the event was an effective means of professional development for teachers.

"It was an eye-opener for me that you can teach like that and trust them to find things out for themselves."

Michelle Crooks, teacher, King Arthur's School

"[The important outcome for me was] to help deliver How Science Works in a different style. Its something that I can feed back to the department in the hope it will modify the teaching of these difficult concepts."

Sarah Gettings, teacher, Acklam Grange School

Other teachers saw this potential immediately.

"[What surprised me was] the amount of interest from other members of the science department and senior management of the school. Almost every lesson in the series was observed - not to evaluate my teaching, but to see what was going on!"

Liz Howell, teacher, Ysgol Tre-Gib

Teachers got new ideas about connecting their science teaching to the real world.

"I learnt new ways to connect science in school to the real science world and careers."

Karen McLoughlin, teacher, Sacred Heart High School

Teachers gained confidence at doing more challenging things.

"The **confidence** to tackle more **controversial** topics in a debating lesson. I would not have opted to do that previously."

Janet Harland, teacher, Hetton School

"Debate / discussions aren't something that they have experienced in their previous schools. I have tried a small amount of discussion work with them previous to our participation with the project but don't feel I was very effective at leading the session. Linking the work to the resources provided (IVF cards for example) gave me more of a structure to work with."

Lynn McCarroll, teacher, Riverside College Halton

And they realised the importance of things they hadn't tried before.

"[I gained] understanding of the need to allow students to debate more openly."

Chris Millington, teacher, Longsands College

Unexpected outcomes: allowed teachers to get to know their students better

One aspect of the different nature of the event that several teachers mentioned was the way that it broke down barriers, not just between students and scientists, but between students and teachers.

> "all of it, fun and exciting with our teacher joining in on the live chats."
>
> *Year 9 student, Mangotsfield School*

Michelle Crooks told us about an example of how she was learning things *with* her students, instead of her always having all the information and passing it to them. She describes what an effective learning tool that was.

During the IVF debate one student asked Michelle how much a round of IVF cost and she said she didn't know. Another student had the card where that was the 'IVF fact' and called out, 'I know Miss, it's £2,500.'

"It made such a difference that we were finding things out together. And far more memorable for the kids."

Other teachers referred to the same thing.

> "It was a good sharing the learning experience with them, and them knowing I was not the expert in particular discussions"
>
> *Lynn McCarroll, teacher, Riverside College Halton*

> "I was able to be a guide rather than a 'teacher' and really had some great chats with the pupils. Some 1-2-1 chats, some small group chats as I went round watching them getting involved in the activities. I was able to listen to their view points without worrying about following a syllabus. I thought this built my relationship with some of the pupils."
>
> *Danielle Fox, teacher, Winterhill School*

Several teachers related it to the fact that they were giving space for students to voice and discuss their opinions, this meant they found out a lot more about their pupils.

> "This group are often a bit quiet. In the discussions I got a real insight into the way they thought."
>
> *Sarah Gettings, teacher, Acklam Grange School*

> "I saw that they had strongly held opinions and saw a different side to them."
>
> *Kirsty Price, teacher, Sherwood Hall School*

> "It was a lot of fun, I became more confident with doing online chats, and I learnt a great deal about my students."
>
> *Dan Hannard, teacher, Woodkirk High School*

1.1.4 What did the scientists get out of it?

Desired project outcomes for scientists:

- Good training in communicating their research and thinking about public responses.
- An opportunity to promote their work and field of study.
- Fun and inspiring.

It was fun!

*The scientists **overwhelmingly enjoyed** taking part.*

15 out of 15 participating scientists would recommend taking part to a colleague.

Asked if they enjoyed taking part, 13 out of 15 said 'Yes, it was fantastic' (best response) and 2 out of 15 said 'Yes, it was OK' (second-best response).

"Expectations exceeded, I thought I would enjoy it but I enjoyed it even more."
Nicola Harris

"I got up in the morning excited about talking to the students… Was a great experience and I have very fond memories."
Tamsin Langley

"Let me know when the next one is!"
Peter Styring

What did scientists enjoy about it?

"The webchats were awesome! They were so fast and furious and exciting and the students were such funny and interesting people... after each one I needed a cup of tea and a sit down because I was exhausted and over-excited, but it was so cool!!"
Liv Hibbit

Scientists really enjoyed the energy and enthusiasm of students.

"Well that was a new experience - I am now initiated into the world of on-line chats! I was really interested by the sorts of questions I was asked and the zany way some of the chats went!"
Jeanette Milbourn

They were inspired by making connections with bright, energetic young people.

"[I learnt] something I already **realised but this event has reaffirmed it for me... students** are an untapped source of genius; we should pay more attention to their opinions and their reasoning as we could learn a lot from them."
Tamsin Langley

> "[I enjoyed] the chance to engage the minds of curious students and answer their questions."
>
> *Chris Rice*

They found it a thought-provoking experience:

> "It's really interesting the questions they come up with! Some of them are really intelligent questions I haven't considered before."
>
> *Vicky Just*

And they enjoyed the personal nature of the communication

> "I like that it gave us a chance to show the kids how scientists are really in many ways quite normal people ;) When you for example go out and give presentations in schools, the questions tend to be more "formal". Whereas here when you're just chatting or in the Q&A, the kids often also asked more personal questions about us."
>
> *Heidi Dvinge*

What was different about this event, compared to other forms of engagement the scientists had been involved with?

> "I think the online nature of it meant the students were more comfortable asking questions... when you are talking to a class of students you NEVER get the number of questions or the social interaction that happened in the webchats. The students clearly felt **very comfortable** using the media and felt that they could ask anything without looking stupid, this lead to some excellent questions and very interesting conversations!!"
>
> *Liv Hibbit*

> "More two way than some group activities, it was easier for kids to ask questions from a distance without being shy or inhibited in front of their peers (which sometimes happens in the classroom)."
>
> *Nick Dickens*

> "Enabled students to ask questions they might not have asked if they were face to face with the scientist in a classroom. Got them very enthusiastic about asking questions."
>
> *Vicky Just*

> "In terms of the number of children involved it was on a **much larger scale** than anything I've done before. And despite this I think it enabled a certain amount of one-on-one communication that would be difficult on such a scale in any other type of event. Brilliant."
>
> *Sam Mugford*

Training in communicating their work

Aside from the fun and energy of the event, scientists felt it was great practice at communicating with a lay audience, particularly young people.

> "The live interaction with pupils was great. It **made me think** about the way I talk to kids and also the Q&A were really good at finding out their perspective on things. It also gave me a chance to show that scientists are human beings too."
>
> *Nick Dickens*

> "I am now excited about my work again!! I also FINALLY managed to explain my work to my Dad in a way that he understood!!!"
>
> *Liv Hibbit*

And they learnt a lot about what young people think of science.

> "[I realised] how much more communication needs to occur between scientists in my field and young people. I was shocked by how sceptical they were about climate change being dangerous and human-induced! This makes me want to do more outreach work."
>
> *Aradhna Tripati*

> "I have learnt that students want to know about the **impact science has on people** - they are interested in the benefits of the research and general outcomes - and you can teach them a lot about all of this without having to go into any detail on the day-to-day technical stuff we do..."
>
> *Jenny Barnes*

Did scientists feel that the students learnt much about their field of study?

Scientists were very surprised by the interest shown in their science by the students.

> "Some kids had obviously gone away and read up on my area. They came back and asked specific questions. I was surprised by that."
>
> *Sam Mugford*
>
> *(Sam studies the genetics of the biosynthesis of avenacin, a chemical produced in the roots of oat plants, which protects them against a fungal disease called Take-All)*

> "I see [winning the event] as a victory for psychology rather than me. From the questions I was asked it was clear this was an area that the school-aged students simply hadn't been exposed to, and which they found really interesting."
>
> *Ian Walker*

> "The volume of questions asked in the QA sessions showed a real interest in science."
>
> *Chris Rice*

What would be the impact for organisations of their members taking part?

The event can be a great staff development tool. Institutions benefit from the increased energy and inspiration our scientists got from talking to young people, and also from scientists' increased communication skills and ability to discuss their work. It also helps create positive links with other organisations and communities.

- Staff development for communication skills, and inspiration
- The opportunity to promote their company or institution to young people
- Positive relationships with schools and teachers
- Good 'human interest' press coverage

Promoting to schools and young people

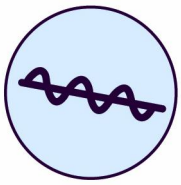
Post 16/Sixth Form students asked a lot of careers questions, especially in live chats and took a lot of advice from the scientists on places to study and possible career paths. Younger students have more vague plans, but there is certainly scope to plant seeds of interest.

> "[The students gained] more of an idea about the wider aspects of science and what it covers, and what they can do with their science qualifications. We now have several students who have totally been inspired by the scientists involved!"
>
> *Janet Harland, teacher, Hetton School*

Press coverage

There is considerable potential for positive press coverage of the event. We at I'm a Scientist didn't have the resources to really promote the event. And it's not necessarily a big enough story to make the national press. However, Oxford University press released Liv Hibbit's involvement in the event and she was interviewed on the local radio station (BBC Radio Oxford, you can listen to the interview at www.imascientist.org.uk/press) and it would certainly be of interest to local and trade press.

In our survey of council staff who've taken part in our I'm a Councillor event, 53% got coverage on the local radio station and 83% got coverage in local papers.



1.1.5 Analysis: What led to these outcomes?

Key factors: it was fun!

*The event generated **excitement and enthusiasm** for science and science lessons from students. And this made it more memorable.*

92% of students surveyed said they liked the format of the project.

31% of students surveyed went on the website at home, in their own time.

"i liked everything about this website and i would recomend it to a friend who enjoyed doing science this is a fun way to work!"

Year 9 student, Hetton School

"They enjoyed talking with the scientists and there was a huge buzz in all of our lessons."

Lynn McCarroll, teacher, Riverside College Halton

"I really enjoyed using this website there should be more for english and maths and subjects!"

Year 9 student, Hetton School

"The pupils were looking forward to their science lessons, asking about them in the corridor etc."

Janet Harland, teacher, Hetton School

"I enjoyed taking part in the activity and i hope there will be another oppertunity to take part again soon."

Year 9 student, Heanor Gate Science College

"The students keep asking when the next one is."

Dan Hannard, teacher, Woodkirk High School

"really great fun some new info to add to our ever growing brains =]"

Year 9 student, Mangotsfield School, Bristol.

Key factors: the whole 'event' felt special

All the activities were different and of high quality, but the fact that they were part of a larger event helped to create a buzz about it.

"Whichever bit they were doing, as soon as they came into class and saw the logo they knew it wasn't going to be a 'normal lesson'."

Michelle Crooks, teacher, King Arthur's School

The distinctive visual identity of the event (logos, pink teacher folder) helped to tie things together, so that even the more 'normal' classroom lessons felt special.

"I think the students engaged with it [debate activities] because it had the project logo and was therefore worthwhile."

Lynn McCarroll, teacher, Riverside College Halton

Key factors: excitement of online medium

*Students found it **exciting** to be talking, live, to real scientists. It was particularly exciting to be doing something so different in a science lesson.*

58% of students surveyed named 'live chat' as the activity they'd learned the most from.

When asked 'what did you like about IAS?', 26 out of 68 students who answered the question said, 'chatting to scientists' (the next most common answer was 'everything' with 11 responses).

"It was like we were talking to them in real life."

Year 10 student, Hetton School

Michelle Crooks told us how exciting her students found the live chats, "People passing the window were wanting to see what they were doing and join in."

"It was easy to keep their attention. Normally they start putting their coats on five minutes before the end but [when doing the live chats] they were in their chairs still after the bell went." The students would ask, "Do we get to do a chat today?"

"I've really enjoyed it because it's much more fun than normal science work."

Year 9 student, Sacred Heart High School

Key factors: intimacy of online medium

Because it's an intimate medium, which young people are familiar with using to talk to their friends, you get a good quality of engagement and it breaks down barriers.

"If you go into a school you're already set apart from them as you're leading the group but here you can chat to them as if you are one of them and they can ask you anything. As a result they ask a wider range - and more - questions than you'd be asked in a classroom."

Liv Hibbitt, Scientist

"I think it engaged the kids in a way I've never seen before."

Nicola Harris, scientist

"Enabled students to ask questions they might not have asked if they were face to face with the scientist in a classroom."

Vicky Just, scientist

"I didn't realise just how much fun the live chats would be and what a **great rapport** we would build up over a computer!"

Tamsin Langley

The intimate medium also made everyone (young people and adults) seem more equal.

"all of it, fun and exciting with our teacher joining in on the live chats"

Year 9 student, Mangotsfield School

> "I enjoyed it and learnt more about my students as I was talking "with them" rather than "to them" if that makes sense?"
>
> *Michelle Crooks, teacher, King Arthur's School*

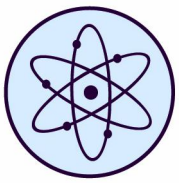
This equalising was helped by the fact that students' familiarity with the medium was often greater than the teachers.

> "ICT - teachers are so far behind the students."
>
> *Helen Mitchell, teacher, Heanor Gate Science College*

The intimate medium can also draw out quieter students and change the class dynamic.

> "I gained confidence in using the chat facility as a learning activity. I had a go at using it with my class before the live chat session and will definitely try it with other groups in the future because there is an interesting change of class dynamics when chatting online."
>
> *Lynn McCarroll, teacher, Riverside College Halton*

Lynn pointed out that it was easier to ignore some of the more dominant characters in the class because their contributions were limited to a sentence that appeared on the screen rather than them being physically vocal in the classroom. Many other teachers mentioned getting more input from quieter students in live chats.



1.1.6 Analysis: Content of interactions

Live chats

A brief analysis of how young people behaved in live chat and what this can tell us about the event. Key aspects of live chat were the way that it created a friendly intimacy between students and scientists, the way that it allowed ongoing conversations and a back and forth of questions and testing understanding.

These were easily the young people's (and teachers') favourite activity. They enabled a connection between scientist and students, and helped more than anything to dispel the negative stereotypes about scientists.

Young people are frequent users of live chat type technology (eg MSN) to talk to their friends, and so find it a familiar and intimate setting. They feel comfortable and far less over-awed than they might be in a lecture. Students got very excited that real scientists were talking to them live.

You could see how **touched** young people were and how much they appreciated the attention they got, and the rapport this created between them and the scientists.

Quessy Bomb:	*Ok thanx for all your help Jenny & Sam Bye for now x*
livvie:	*thanks for answering our questions*
nufc4life:	*jenny n sam thank you for your time*
sarah101:	*we looked for you on google + seen a pictiure of you + som others, thanks 4 answering my questions take care talk soon Bye*

And because they'd been taken seriously, the students responded with warmth and generosity to the scientists.

mattyfatty:	*Thanks for the chat we know you answered some difficult questions got to go end of day*

You could also see how the conversation was ongoing. Students would come on and refer to the previous chat they'd had and this was clearly very significant for them.

J.everill:	Hi Jenny, I ate that bit of cake for you?
J.everill:	hello nice too see you too
mcrooks:	Hello again from King Arthurs school
J.everill:	Jenny: Good ate some for me too.
Jenny Barnes:	J.everill: Hey!! How are you! thanks - I'm going to try find some for myself today ;o)
Heidi Dvinge:	@J.everill, hey, nice to see u again

Students would particularly be really boosted by the scientists' remembering them from a previous chat.

ESherry: *Tamsin, wow u remember about that i dont really agree with animal testing!*

aliceMolko: *yaaay im remembered*

But live chats aren't only good for the 'cuddly stuff'. The instant interactivity of chats also meant that students could probe further and check their understanding.

electrocrunk: *tamsin, have you done any mri scans on rats so far? if so what conclusion have you come to ?*
Tamsin Langley: *electro: nice question... yes i have. i have done 5 studies and I have great results. the reason I am doing this apart from finding better antidepressants is cos less animals have to be used*
Tamsin Langley: *electro: and they are not in pain as they are under anaesthetic*
electrocrunk: *so inorder to find a better aintdepressant you test you theory on rats brains & measure their brain waves?*
Tamsin Langley: *electro: does that make sense. where oxygen is there is activity. so we can see activity in the brain using MRI*

Or ask questions about what they'd read in the scientist's Q+A and find out more.

muchogusto11: *i have a question for tamsin u no u sed u used 2 be agenst animal testing what made you change your mind?*

Topics covered were broad. Young people asked scientists lots of questions about their lives and hobbies, they shared their own information (eg about their pets, what they thought of their teacher). Students asked lots of questions about how the scientists got to be where they are now, what they thought of science at school, what it's like going to university. And they also asked a lot of questions about the scientist's research, and what they might do with the money.

A very common topic was why the students should vote for that particular scientist. This showed students using the opportunity to take their vote seriously and weigh up their options. This, in miniature, is a key issue in science – how, with finite resources, do you decide how to allocate them? Facing this decision themselves gave students a practical appreciation of those **pressures in science funding** and a chance to explore the issues. The interactive, ongoing nature of live chats meant students could debate and explore these issues with the scientists.

Mini08: ian -- if i voted for you can you guarentee for the future that we will have better road safety ?
King Yom: whats are the chances that people will get run over ian?
King Yom: yes but 1 in 3 people are affected by cancer so why do you deserve the money more than somebody reserching cancer?
charl&rach: MARIA TENNANT: so you don't really need the money because you already have access money to

	conduct your research
Mini08:	good luck ian i will vote for you gtg nearly home time bye.

Q+A section

A brief analysis of the kind of questions asked in Q+A and what this can tell us about the event. Key was that Q+A empowered young people and let them explore – whatever their level or interest they could ask what they wanted to. An enormous range of subjects were covered and young people used Q+A for three things – to relate to scientists as fellow human beings, to expand their knowledge of science, and to test and explore issues.

> "I liked reading about the scientists and different fields in the world of science and I liked being able to ask questions."
>
> *Year 9 student, Sacred Heart High School*

Overview
Live chat was clearly the activity which most involved students and created a connection between students and scientists. The Q+A section was where that connection was deepened and, often, more information exchanged.

The questions submitted by students were incredibly wide-ranging and showed a real enthusiasm for finding out about science and the scientists. Some questions were very **advanced**:

> "What would the universe be like if entropy, as opposed to incresing over time, were an exactly conserved quantity that stayed constant and could only be transferred from one substance to another?"

Some were very **thoughtful**:

> "In clinical trials, rats or other animals are used generally, which I should say I'm for (on a strictly medical basis) - how does this transfer onto human beings though? I've often wondered how it works, especially if something does go wrong in the transferance from animal to human testing. Also, more in relation to your work, even if a cure to malaria is found, how, in developing countries, will these vaccines be given out, as this is where they're needed most desperately?"

Some were simply curious,

> "How does a freezer actually work? What makes it cold?"

> "What is more dangerous volcanoes or earthquakes?"

Some seemed more **lighthearted**, or even trivial,

> "If you were an animal what animal would you be and why?"

But these more personal questions (we also had toast toppings, favourite fruit pastille, what colour labcoat you would choose if they came in different colours…) actually show the students using the event as intended – to humanise scientists and relate to them as people. It's certainly a mistake to think that students asking these questions were unintelligent or only interested in trivial matters:

> "And in case you were worrying about the randomness of my questions (fruit pastilles, desert island, rubik's cube...) and the fact that my vote counts towards who stays and who leaves, don't worry - I'm still taking into account all of your profiles, and the science related questions that OTHER people ask - I just thought I'd provide you with a few different questions :)"

There were also many questions relating to the scientist's project briefs, or their answers to other questions.

> "Is there likely to be a chance of disease and infections after the polymer is inserted as a replacement? And is the body likely to adapt itself to the foreign object effectively? Just like to add that your work seems very interesting & will make bold difference."

> "When you talk about "embyonic" stem cells, are they all totipotent stem cells? Or are they differ in potency?"

These show that the students were taking in information, considering it, and asking follow up questions. The event allows an **ongoing and developing conversation**, so a far deeper level of engagement than a one-off talks or school visits.

Question categories

The categories for questions were:

- About you and being a scientist
- Your theories
- Your test methods
- Possible benefits
- Possible problems
- General
- What would you do with the money?

General was the most popular, with science questions on topics outside the scientists' area, such as:

> "Why is the Earth's core hot? What caused it to heat up? Is it still heating, or now cooling?"

> "did the moon come from the earth or not?"

> "Do you believe in alternate universes where different choices and events have changed the outcome from that of our universe?"

The second most popular category was "About you and being a scientist". Students seemed to relish the opportunity to make a personal connection with the scientists, "Are you nervous for the eviction?", "Which scientist would you say is your role model? If they are not a science role model, a role model in general".

To find out more about what it's really like to be a scientist they asked: "Are you always stuck in a lab while working?", "Whats your favourite part about your job?", along with questions on the stereotyping of scientists, "Are you all stuffy up tight so and so's?"

Other categories saw students ask more specific questions about the scientists' work. They were particularly concerned about the extent of possible benefits. "You state that about 100,000 people in Britain have the disease which may benefit from the research.

Approximately, how many people worldwide could benefit?", "What are you going to do once you have the information you are looking for? How will you use this to make the roads safer?"

Controversial Issues

Students also asked many, many questions about animal testing, from the straightforward, "Do you like animals and do you test on them?" to the more complex, "i'm sure you've had many questions about why you use rats to experiment on. but my queston is what other animals could you maybe use to experiment on? if their are other animals then why use the rats? are their brains more similar to ours? thank you."

It was obvious that students felt very strongly on this issue and it seemed useful that they got the opportunity to find out more about it. The same applies to global warming, where we had many questions, from the sceptical: "Do you believe that global warming is actually happening and just isnt a trick from the government to stop us buying oil and petrol?", to the worried: "Do you believe that since Global warming is happening, that we should stop all reserch on Cancers and illnesses, and focus all of our Money and time on Trying to prevent Global warming?"

Conclusion

The Q+A section allowed **depth and thoughtfulness** of interaction. Students could think about their questions before asking them, scientists had time to think about the answers and students could think about and discuss the answers, and come up with follow up questions.

1.1.7 Analysis: Young people's decision-making, can they be trusted?

Would it be possible, in the future, for young people to have input to decision-making about science funding? What evidence can we draw from I'm a Scientist about how young people would make those decisions?

Live chat, 10.45am, Wed 18th June
Ysgol Tre-Gib class 9(1)

Extract from chat transcript.

Nerdchild:	Nicola, how did you discover that this form of cancer could be treated with radiotherapy?
nuttynatty:	how does reserching on pretend people made of perspex help you to know how humans will react with the method?
Elin Ch:	Nicola : How will your work help? How many people actually have this kind of cancer in the UK?
Sionz:	Maria, would you say that your skin care products are more important than cancer research, such as Nicola's work?
Helz-x:	Maria, I want my vote to go to someone who will do something beneficial! Do you really think yours is?
taggiejinx:	nicola we have been really impressed with your work and answers so we decided to give your our vote! :) good luck with your research!! :)

This event is based on I'm a Councillor, where young people are choosing the councillor to be 'Youth Champion' for their council. When we started developing I'm a Scientist we realised that young people still needed to be making a **meaningful choice** over something. Young people aren't stupid, and if the choice they are making is meaningless they will feel patronised (when we've been trying to empower them) and take the task less seriously (when we've been trying to get them to really engage with the issues).

We wondered if it would be possible for the young people to decide who got a research grant? Competitors could be pre-vetted, so there would only be credible applications on the table. We spoke to The Wellcome Trust, who said that while some people would support the idea of young people making real decisions, 'others would say that's crazy talk'. It appears that many adults think that young people would make capricious or trivial decisions.

We decided to have a prize of £500 for scientists to promote their work instead. The amount was about the most that was manageable out of a realistic budget for the event. We decided it should be for promoting their work, rather than towards the work itself, as £500 would be a drop in the ocean for research funding, but is a significant amount towards a small-scale science communication activity. We also thought it was a good opportunity to find out a bit about young people's attitudes to methods of science communication.

But the question remains, **what would have happened** if young people had been choosing which project got funding?

Here is the list of competing scientists and what they study, in order of the student's preference (ie the first scientist on the list is the one who won, the last is the one who got the fewest votes).

GCSE GROUP 1:

Jenny Barnes, Mullard Space Science Laboratory.
Jenny studies climate and is attempting to build a model to successfully predict droughts in East Africa.
Peter Styring, University of Sheffield.
Peter studies the use of polymers to build artificial muscles, he is particularly trying to develop a treatment for rectal incontinence.
Tamsin Langley, Neuroimaging Research Group.
Tamsin studies the effects of antidepressant drugs on the brain.
Sam Mugford, John Innes Institute.
Sam studies disease-resistant genes in plants.
Heidi Dvinge, Corpus Christie College, Cambridge.
Heidi studies embryonic stem cells.

GCSE GROUP 2:

Ian Walker, University of Bath.
Ian studies the behavioural and psychological causes of road accidents, in order to work out ways to prevent or reduce them.
Nicola Harris, King's College Hospital.
Nicola is a trainee clinical scientist, working with nuclear medicine and MRI scanners.
Vicky Just, University of Bristol.
Vicky constructs and researches enzymes to be used in anti-cancer drugs.
Maria Tennant, Unilever.
Maria develops skin care products.
Chris Rice, Institute of Food Research.
Chris studies salmonella at DNA level.

SIXTH FORM:

Nick Dickens, Institute of Cancer Research.
Nick researches how genetics can improve our understanding and treatment of leukaemia.
Liv Hibbitt, University of Oxford.
Liv is searching for a way to cure genetic conditions by modifying or replacing faulty genes.
Aradhna Tripati, University of Cambridge.
Aradhna studies the history of Earth's climate by studying geological evidence and fossil records
Trevor Cox, University of Salford.
Trevor studies the way humans respond to sounds.
Jeanette Milbourn, Brannon Milbourn Ltd.
Jeanette specialises in the government regulation and approval of drugs and medicines.

Certainly one could argue about what priority these research areas should have, or which scientist's work is most important, which is why we have funding panels. But can you see a case where you think that trivial work has been chosen over something significantly more useful for humanity?

Students have certainly been influenced by the personality of the scientists, by who took the most time to talk to them, and by who communicated best with them. But then, your ability to explain the importance of your work will also affect your ability to secure traditional funding.

Anecdotal evidence

We saw a lot of anecdotal evidence that students were deciding on what they thought was most important, rather than treating it as a 'scientist beauty contest'. You can read the live chat extract above and feel how **seriously** the young people are taking the decision they have to make. The fact that they have a vote is making them think seriously about issues of value and public good.

Maria Tennant was a very good contestant, she attended most live chats, she was friendly, helpful and approachable with students, her writing was clear and unpatronising. The young people clearly *liked* her. But few of them voted for her, because, as you can see in the extract, young people thought her work (on skin care products at Unilever) was less important than work on cancer or reducing road accidents.

Similarly, Trevor Cox was a funny and interesting competitor, who engaged well with young people. His research area was 'cool' – being concerned with acoustics, including some areas of music production, etc. However, young people felt this wasn't going to help the world sufficiently, and that curing diseases and studying climate change were more important.

In chats students frequently brought up the question of whose research could help the most people/have greatest significance. In fact, when the event producer went into two schools to observe live chat lessons, much of the offline conversation between the students revolved around which research areas were most useful.

One student was **excitedly quoting statistics** on road traffic deaths from Ian Walker's Project Brief in order to persuade his neighbour that it was more important than cancer. Another student replied with Vicky Just's fact that one in three of us will get cancer. This led to a discussion about whether this was the number of people who *died* of cancer, or included all the people who survived. There was then a discussion about how common was the particular cancer that Nicola worked on.

These were complex issues being raised and debated by students who were clearly taking the decision seriously.

Student feedback

One of the questions we asked in the student feedback survey was, "What influenced your choice of scientist to be kept on the website?"

Their question answers eg "how well they responded to questions"	33
Usefulness of their research "what they did- how it could help people" "Jenny was the only one whose cause was the best as she was trying to help under developed countries who are in a despairing state."	25

Personality "the sound very nice and reply quickly and are understanding" "i liked ian he was cool"	23
I approved of the work "how good their work was" "it depended on what topic it was"	21
Other "i liked the way she was studing animals but she wasn't harming them" "he gave me a wide range of universities and courses to take and told me about them"	14
Where the money went "what they are going to use the money for."	6

Based on 98 students answering the question (out of 143 who completed the survey). 21 students gave two or three reason.

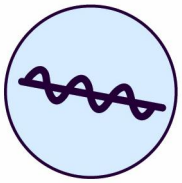
You can see that personality is the third most common answer, not the top one, and that many students took very seriously the fact that they were entrusted with a decision. 'How they answered questions' was the most popular answer, but students often seemed to be appraising the scientists through their question answers, "the one that argues the better answers", rather than saying this in a self-centred way.

Explicit mention of the usefulness of the work was the second most common answer, but we only coded explicit mention of usefulness as this. Many of the "I approved of their work" answers were ambiguous, ("how good their work was") and could mean that students were focusing on the wider benefits of the scientists' work.

Conclusion

In short, **young people have not treated their vote frivolously**, as sceptics might expect. They haven't necessarily made the same decisions that a panel of august experts would make, but odds are, neither would a panel of lay adults. If it's conceivable that the adult public might have input into decisions about science funding, we see no reason why young people shouldn't also.

And in terms of getting young people really engaged in issues around science, developing their ability to think critically and holistically about science and society issues, and making them feel ownership of UK science, there are many, many potential benefits.



1.2 Activity levels

	Total	Per user	I'm a Councillor UK average 2007 for comparison
Registered users	851	n/a	n/a
Questions asked	1288	1.5	1.3 per user
Log ins	2882	3.1	2.0 per user
Votes cast	920	1.08	0.7 per user
Lines of chat by scientists	7,525	2,508 (per group)	263 (per council)
Lines of chat by students	19,910	6,637 (per group)	1679 (per council)

The pilot event ran from 16th-27th June and 40 classes of students took part.

1.2.1 Discussion of activity levels

Overall activity levels

Activity levels on the site were **much higher** than we'd predicted. The questions asked per user and votes cast per user are both higher than the I'm a Councillor (IAC) averages for 2007. This is particularly impressive as in IAC 2007 approximately half of the councils had run the event before. This meant that councillors and council staff, and crucially teachers, in those councils knew what they could get from the event and what to expect. We see activity levels in IAC climb year after year, particularly noticeably in returning councils, as teachers, having seen what the event can do, make far more of it in subsequent years.

Particularly striking though are the log ins per user and the lines of chat. The log ins show that students are returning to the site for several visits. This is fantastic as it shows they are really **getting the most out of the site** and having an ongoing relationship with it and with the scientists. The lines of chat show how enthusiastically both students and scientists threw themselves into communicating directly with each other. These figures are higher than our chattiest ever council in I'm a Councillor.

Analysis of site visit data from Google Analytics

Visits and visitors
Over the period of the event (June 2nd – June 27th) 5,124 visits were made by 2,675 absolute unique visitors. Google analytics notes the computer the visitor is using, so this is not necessarily 2,675 people visiting the site – many people will visit the site from more than one computer (eg home and work or school), and some computers (eg in a school ICT room) will have been used by more than one person. Thus, despite the

seeming accuracy and mass of data generated, the conclusions one can draw from this data are limited.

683 visitors came back for at least a second visit (25% of all visitors). 50% of *visits* were one off visits. In total returning visitors visited on average 2.82 times. 107 visitors had previously visited the blog prior to the event, out of a total of 1,414 visitors to the blog.

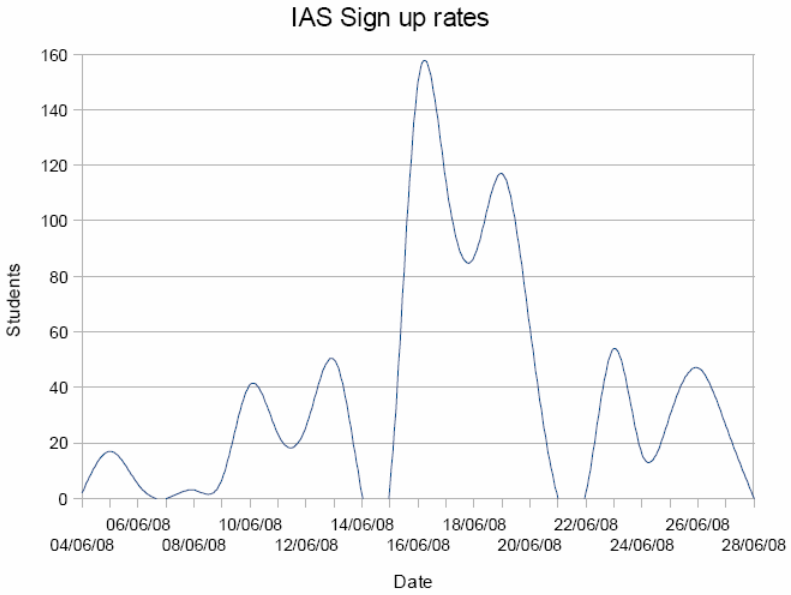
The visitors on average viewed 15.63 pages per visit (cf. 9.78 for IAC2007) and spent 14:27 minutes per visit. When only including visits that included one of the group homepages (ie people who logged in) then average page views is 23.28 and average time 22:30 minutes.

Considering that 25% of all visits were under one minute this is a long visit. IAC2007 averaged 10 minutes per visit. Most visits (nearly 60%) were over three minutes in duration and 15% (787) were over 30 minutes long. Over a quarter of visitors visited over 20 pages per visit.

In short the site was well visited, in terms of absolute numbers, the length of time spent on site and the number of pages they visited.

Length of Visit	Visits	Percentage of all visitors
0-10 seconds	810	15.81%
11-30 seconds	300	5.85%
31-60 seconds	348	6.79%
1 to 3 minutes	666	13.00%
3 to 10 minutes	1,020	19.91%
10 to 30 minutes	1,193	23.28%
30+ minutes	787	15.36%

Visitors' IT
The majority of users (70%) used Internet Explorer 6 or 7 and were using Windows PCs (90%). Their screen resolution was 1024 or higher and only 4.5% used 800×600 or less.



20% of students signed up before the 16th June (the start of the actual event). 60% signed up in Week One and the final 20% in Week Two.

This is slightly disappointing as we had made sure the site was available almost two weeks before the start of the event proper, so that teachers could do background work with their students, introduce the event and get to know the scientists, before getting to speak to them.

Although we had informed all teachers of this several times by email, on the site, on the blog and in the teacher briefing notes, it appears not everyone realised. At least one teacher in the post-event interviews mentioned that she would have liked the site to be online before the event started, in order to test it out.

However, we realise that even for those who realised the site was online early, many teachers had a limited number of lessons available: they couldn't spend a month on the IAS event, however much they might have wanted to. Many teachers mentioned that if running the event again they would devote more time to it. Given the current pressure on results and covering the curriculum, it was obviously going to be difficult for many teachers, no matter how enthusiastic, to convince heads of department to let them spend a significant amount of time on an untested pilot event.

Registration page
2,285 visits to page with 985 unique visits. This implies that students had to come back to the page. Average time spent was 01:33, which could be reduced, and perhaps we need to consider streamlining registration.

Cast your Vote page
4,773 visits, 1,421 unique visits, 00:26 average time spent. This implies that students kept coming back to this page within an overall session on the site. Saw slightly *more* visits than:

Live Chat
4,509 visits, 1,776 unique visits, 03:27 average time spent.
Students spent most time on Chat.

Student numbers

Overall student numbers were slightly lower than we had hoped (our target was 1,000), because some classes who were supposed to be taking part dropped out, due to staff illnesses, school re-organisations and timetable clashes. This was a shame, as many more teachers applied to take part than we had space for.

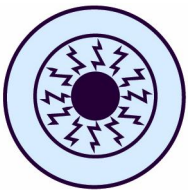
We had originally planned to involve 40 classes – 20 pre-16 and 20 post-16. What we found was that far more pre-16 teachers contacted us to express an interest in the event than post-16 teachers. We only had 11 post-16 classes express an interest in the event, while we had 86 pre-16 classes interested in taking part.

It turned out that the timings, while ideal for year 9s, overlapped with exams for most post-16 classes.

We also had interest from far more promising scientists than we needed. Rather than waste capacity, while turning away keen teachers, we decided to run two pre-16 groups and one post-16 group. Instead of having two pre-16 groups of 20, we decided to have one group of 20 classes and one of 15. This enabled us to compare activity levels and the manageability of the workload for scientists.

This, along with the late addition of one extra class, gave us 47 classes taking part in the pilot. Of these, three schools (representing five classes) were unable to take part in the end, due to various timetable clashes or school problems. Two further schools involved only one class, having initially said they would involve two.

Learning point
Schools (and teachers) have many conflicting demands and no matter how positive they are, how clear one's communication, some will inevitably drop out. With hindsight we could have included more schools, to allow for wastage. Although actually both pre-16 groups were extremely active and perhaps any more classes would have been too much for the scientists.



1.3 Recommendation for the future

The proportion of students choosing to study science and technology is falling in the UK. We are likely soon to start facing a shortage of qualified science and technology graduates.[1] Research suggests that students are put off studying science by 'poor and uninspiring' teaching methods[2], and by negative cultural perceptions of science[1].

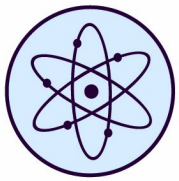
The government, and other stakeholders, are keen to address this by investing in Continuing Professional Development for teachers[3] and various other initiatives. As Lord Drayson said upon his appointment as Science Minister, "Young people need to be inspired into opting for science and engineering careers." We feel there is ample evidence from the pilot that direct contact with real scientists doing real science can inspire and enthuse students. More than that, getting a say in something gives young people a real stake in that science. They feel involved.

But it's not just about recruiting the scientists of the future. Every citizen makes decisions that involve science – about their health, about their vote, about our planet. It's important that **all** young people (not just those who will go on to become scientists) have the skills to talk about science, evaluate scientific claims and understand how science works (or even How Science Works).

This event can supply that. And inspire students too. The hard work has been done, the resources have been developed and tested, now we just need to get it into more classrooms.

We propose to run another, slightly bigger event in March 2009 (for National Science and Engineering week), involving 200 classes. We would then run a much larger event in June (as this is the ideal time for teachers), aiming to reach 1,000 classes. We would run smaller events again in November and December 2009, allowing flexibility for teachers to use the event when it fits in with their curriculum. The overall target would be 1,600 classes and approximately 32,000 students. This would involve approximately 500 teachers.

As a happy by-product, all of these teachers, even the sceptical (if our pilot is anything to judge by) would find it introduced them to new and more inspiring ways of teaching. Teachers taking part in the pilot found it increased their confidence in letting students debate and tackling contentious issues in the classroom.



For other, more minor, recommendations please see Appendix 5.

[1] "Encouraging Student Interest in Science and Technology Studies", OECD publications, December 2008
[2] "Success in science", Ofsted, June 2008 (report can be downloaded from http://www.ofsted.gov.uk/content/download/1315/9627/file/Success in science (PDF format).pdf)
[3] For example, Project ENTHUSE, http://www.wellcome.ac.uk/News/Media-office/Press-releases/2008/WTD039207.htm

2 Development of the project

2.1 Background: public understanding of science and How Science Works

Since the Bodmer report in 1985 there has been a growing enthusiasm for the public understanding of science, originally conceived as 'teaching the public more science'. More recently a consensus has emerged (expressed, for example, in the House of Lords select committee report on Science and Society, 2000) that communication is a two-way process and scientists need to engage in a dialogue with wider society. It's also considered that scientists need to be trained to consider the wider implications of their research.

For citizens to meaningfully participate in this dialogue, and to make decisions in their lives, it's now felt that an understanding of the scientific process is in many ways more crucial than an understanding of specific science facts. This has been reflected in the new (2006) GCSE syllabus with its emphasis on How Science Works, in changes to the KS3 and A Level syllabi and the addition of a 'Science for Public Understanding' AS Level.

The curricula now consider issues like how scientific consensus is reached, dealing with scientific uncertainty and the wider implications of scientific activity. These crucial, but sometimes abstract or esoteric, questions can be difficult for teachers to teach, especially when they may not have had any training in the area themselves. There is also a new recognition that real world experience or 'experiential learning' is far more memorable for young people and helps them to develop life skills.

2.2 Genesis of the event

I'm a Scientist is based on I'm a Councillor, Get me out of Here! (www.bigvote.org.uk), a youth engagement event for local councils which Gallomanor run for Local Democracy Week. I'm a Councillor has been running for five years and in that time 15,000 young people have talked to hundreds of councillors around the UK and asked them tens of thousands of questions.

The project leader (Sophia Collins) has worked on I'm a Councillor for four years and also has six years experience in science communication. She realised that the I'm a Councillor format could also work extremely well for science. Science and local politics have some similarities in their difficulties in engaging young people, in that both can be seen as 'boring' and remote. Young people may also have negative stereotypes of those involved. We have lots of evidence that I'm a Councillor addresses these problems and it seemed natural to try it.

Gallomanor conducted some preparatory research into the feasibility of the idea, using desk research and informal chats with science communicators, science teachers and spending a day in a school. The message from this research was overwhelmingly positive. We also had an initial conversation with the Wellcome Trust, and attended a workshop on applying for People Award grants. Their response and that of fellow attendees at the workshop was also very positive.

We planned the project and budget and applied for a People Award, which we were awarded.

2.3 Funding

We are very proud to say that this event has been kindly supported by a People Awards grant from the Wellcome Trust of £29,226.

2.4 Aims and objectives

The aims and objectives we set at the start of the project were:

2.4.1 Aim

To create a novel, flexible and effective science engagement tool (ie the I'm a Scientist event) which can be used repeatedly in future to engage thousands of young people.

2.4.2 Objectives

The overall project objective was to create, pilot and evaluate this tool.

The specific project objectives were:

1) To run a pilot 'I'm a Scientist, Get me out of Here!' online event:

a) Consisting of:

i) A moderated, interactive website based on I'm a Councillor (www.bigvote.org.uk) where five scientists for each event (GCSE and A Level) explain their work, answer questions from young people, have live chats with them and compete for their votes.

ii) Supporting teaching materials which encourage debate, discussion and learning about how science works and the social implications of biomedical research.

b) With the following activity levels:

- Involve **1,000 young people** (600 GCSE students, 400 A Level students)
- Involve **20 classes in each event**, across a range of schools, across the state and independent sectors, throughout England and Wales
- 500 questions asked
- 500 votes cast
- 1,000 log-ins to the website

c) With website performing technically as described.

2) To evaluate the pilot to see whether the desired outcomes have been achieved (eg in terms of positive effects on participants).

2.4.3 Desired Outcomes

We were defining outcomes as 'the things we hoped would happen', through achieving the more concrete *objectives*.

Desired project outcomes for young people:

Debate and discussion:

- Practice at **debating and discussing** biomedical research and issues raised by it.

Science made real:

- A better **understanding** of How Science Works – particularly things like uncertainty, the problems of interpretation, links between experiment and theory, science as a collaborative endeavour, etc.
- A more realistic and internalised understanding of how decisions about funding science are made and to think about how we allocate finite resources.

Scientists humanised:

- A broader and more positive idea of who 'a scientist' might be – science has been a little **humanised** and de-mystified for them.

Empowering:

- Confidence in using their **scientific skills** to explore issues and make decisions.
- A feeling that science engagement is 'inclusive' and their opinions are **valid and welcome**.

Careers

- A better sense of careers in science, and the genuine excitement and interest of working in science.

Desired project outcomes for scientists:

- Good training in **communicating** their research and thinking about public responses.
- An opportunity to **promote** their work, and field of study.
- **Fun** and inspiring.

Desired project outcomes for teachers:

- The event should **work well** 'straight out of the box'.
- The event should be an **effective** way of teaching science and society and How Science Works aspects of the curriculum.
- Young people should find it **fun**, memorable and involving.

2.5 Development of the project: what did we do?

There were three main strands of work:

- Organisation of event
- Design and build of website
- Development of accompanying teacher resources (lesson plans, info sheets)

Some of what we did and what we learnt may be of use to fellow practitioners, so we include the information here.

2.5.1 Organisation of event

Recruiting classes (ie teachers) to take part

Teachers were recruited via the project blog, emails to Psci-Com (science communication email distribution list), the ASE, the TES message boards, the Science Learning Centres and Planet Science. Emails were also sent to educational press but received little coverage.

We also emailed all the teachers whose emails we have from taking part in I'm a Councillor and asked them to pass the info on to science teachers who they thought might be interested. And we directly emailed or wrote to seven schools in the local area, as we were keen to have nearby schools taking part so that we could possibly go in and visit them.

The biggest spike in applications was after an invitation appeared in the Planet Science newsletter.

Recruiting scientists

Scientists were also recruited via the blog, email to Psci-com, emails to a list of learned societies, major universities and some companies with a large R+D department.

Selecting classes (teachers)

Fifteen teachers had contributed feedback prior to the event, and so were automatically offered a place. In selecting the remainder, our ultimate aim was to have as **broad a range** of schools as possible. There's no point having a pilot composed of very similar schools.

Of the remaining teachers who had expressed an interest we asked:

1. Number of classes they would like to take part
2. The year group
3. Qualification students were studying for
4. Exam board

We also looked up the league table statistics for each school (percentage of students getting five or more GCSEs grade A-C, A/AS level points per student and type of school), and location.

We then selected schools to give a range of exam boards, type of school, geographic location and setting (eg rural, urban) and academic achievement. The applying group was weighted towards high achieving schools (those teachers were more likely to apply) so we preferentially selected schools with lower GCSE scores, and also deliberately included the only schools who applied who were:

1. Scottish
2. Welsh
3. A Special School
4. A Sixth Form College BTEC National Diploma class

Selecting scientists

We had to have a focus on biomedical scientists due to Wellcome funding, but within that we wanted to pick the **biggest range** of different/interesting areas, range of ages/seniority of scientists (from PhD students to Professors) and type of institution (universities, industry, etc). We preferentially chose scientists whose work raised interesting issues (eg stem cells, animal testing).

We further felt it was important to pick scientists with enthusiasm, good communication skills and some **insight into young people**. To test this we asked all interested scientists to submit a one-sentence explanation of what they did, and tell us what they thought young people would get out of it. We incorporated the opinions of young people by showing the scientist submissions to Elliot, a 16-year-old boy who works part time for Gallomanor as an office junior and got him to rate which he thought were most interesting. We then took all these factors on board in deciding which scientists to include.

Evaluation and testing

During event
We used various methods of 'formative evaluation' to help shape the project as we went along. **Please see section 3.2 for methods and Appendix 4 for outcomes**.

Post-event (summative evaluation)
Objective 1b (ie activity levels) was evaluated using website statistics.
Objective 2 (ie outcomes of positive effects on participants) was evaluated using

- Feedback surveys (with a mixture of qualitative and quantitative questions) for students, scientists and teachers.
- In-depth interviews, post event, with eight scientists and 12 teachers.
- Analysis of user-generated content and activity on website.

External evaluation
To save costs, most evaluation had to be done in-house by the project team. To ensure that despite this we evaluated as thoroughly, effectively and impartially as possible we appointed Yvonne Harris, of Yvonne Harris Consulting, as an external evaluator and consultant on the project.

Yvonne advised on appropriate methodologies and gave us feedback throughout the project. She interviewed three scientists and six teachers as part of the post-event evaluation. Yvonne then certified and commented on this report in the audit section. Yvonne has had full access to all relevant files, survey results, etc throughout the project.

2.5.2 Design and build of website

The website was based on the existing website I'm a Councillor, Get me out of Here! (www.bigvote.org.uk) and was developed by our existing IT partners Tincan (http://tincan.co.uk). We developed a new design (which we tested on young people, please see Appendix 4 for more details) and a new specification, based on findings from focus group interviews and our experience with I'm a Councillor.

2.5.3 Development of teacher resources

These were developed using an iterative process.

A combination of desk research, teacher focus groups and input from educational advisor was used to draw up a draft plan for the accompanying teacher resources (see Appendix 4 for more details). This helped identify relevant areas where teachers would welcome resources, and the kind of resources they wanted.

We employed an intern (Rebecca Davies) who works as a science communicator at Techniquest to work on the teacher resources. Rebecca had considerable practical experience of working with school groups doing a wide variety of activities. She worked closely with the event Producer to develop a more detailed plan.

The draft plan was submitted to the consultation panel of teachers for comments, and their feedback was incorporated into the development of the resources. Draft resources were then produced, which were tested with the teacher panel and educational advisor and further refined.

2.6 Evaluation methodology during development

*We used a number of 'formative evaluation' methods to inform development of the project. This enabled us to **tailor the event** exactly to what was required and what professionals believed would work. There's no point waiting to the end to find out you've done the wrong thing. This section explains what methods we used. Our findings (some of which may be useful to other science communicators) are in Appendix 4.*

We used the following methods:

- Lesson observation
- Focus group interviews
- Educational advisor's input
- Testing with young people
- Consulting teacher panel
- Project blog

2.6.1 Lesson observation

Sophia Collins (the event Producer) and Shane McCracken (Executive Producer) observed four GCSE science classes in two local schools in January 2008, and spoke to the teachers. The schools were John of Gaunt in Trowbridge, Wilts and St Laurence School, Bradford on Avon, Wilts.

2.6.2 Focus group interviews

Teachers

Sophia and Shane conducted one focus group jointly, with three science teachers at St Laurence School. Sophia conducted another focus group in Bristol, with four teachers from different schools in Bristol. Both groups took place in February. The St Laurence teachers had been teaching for one to two years, the Bristol teachers had all been teaching for over seven years. Between them the teachers taught a range of exam boards (Edexcel, OCR, AQA). This was supplemented by an email response to the focus group questions from one teacher at John of Gaunt, thus eight teachers contributed to this in-depth research.

Scientists

Sophia and Shane also conducted a small focus group with two scientists from the University of Bath and Sophia conducted a telephone interview with another scientist. The focus group and the interview were both conducted in February.

2.6.3 Educational advisor's input

The project's educational advisor was Ian Francis, an experienced Physics teacher, examiner and science communicator. Ian was consulted by phone and email, had occasional face-to-face meetings and contributed via a project wiki, where documents could be commented upon by various people.

2.6.4 Testing designs with young people

We know that the general format works, from our sister project I'm a Councillor. And whether, overall, the format is transferable to science lessons is what the pilot is trying to find out. But something crucial for getting young people's buy-in from the beginning is looking good. There's no point trying to look as cool as Grand Theft Auto, but if you look naff, then that will definitely switch young people off.

We therefore had two contemporary designs prepared (nicknamed 'bubbles' and 'explosions'), to test out. We then recruited two teenagers from the local school and they peer-interviewed 40 young people (aged 14-16) with a simple semantic differentials questionnaire and recorded their responses. We felt that being interviewed by a peer would allow students to be freer and more natural in their responses.

Young people surveyed had to pick three words to describe each design, from a list of 27 positive and negative words (eg intriguing, radical, frustrating) and also answer the question, "If the designs were a student at your school, who/what would they be like? Why have you picked them?" This was to give us more of a sense of what they liked/didn't like about the design and what changes if any might be needed.

2.6.5 Consulting teacher panel

We recruited a panel of 20 teachers to be consulted during development. We advertised the event by sending an email to local schools, Psci-Comm (science communication email distribution list), the ASE, the TES message boards, the Science Learning Centres and Planet Science. Teachers were referred to the project blog, where a simple contact form allowed them to register their interest in the event.

Teachers who registered an interest were emailed with some more information about the event and asked if they would like to be on the consultation panel (and get a guaranteed place in the pilot). They were also signed up to receive email updates of posts to the project blog. Teachers who agreed to be on the consultation panel were emailed questions and drafts of plans, etc to give their feedback.

2.6.6 Project blog

The project blog was built on Wordpress and the development site is still at http://imascientist.org.uk (note, no www., that goes to the event site) We began the blog on January 15th and posted on average weekly. This was a mixture of news about how the event was going and what we were doing, news we thought might be of interest

to potential participants (eg National Science and Engineering Week) and other stuff we came across as we were researching and developing the event.

Anyone could sign up to an RSS feed of the blog, or submit their email address to receive email alerts. Also, teachers and scientists who registered their interest in the event were also signed up to get email alerts.

➔ The findings from this development (ie formative) research are in Appendix 4.

3 Participant case studies

We conducted in-depth interviews with eight scientists and 12 teachers after the event, to give more detailed, qualitative information about what people got out of the event. These give a great sense of what the event achieved for young people, scientists and teachers. Half of the interviews were conducted and written up by Sophia Collins (Event Producer) and half by Yvonne Harris (External Evaluation Consultant).

Yvonne Harris
Yvonne Harris is an experienced evaluation consultant whom Gallomanor employed to advise on planning and process of evaluation throughout the project. Yvonne specialises in interactive science engagement projects and has worked for the Science Museum, the British Museum and London Zoo, among others. She conducted in-depth interviews with six teachers and three scientists after the end of the project. This was to give an impartial qualitative assessment of the effectiveness of the project.

Sophia Collins
Sophia Collins is Producer of the I'm a Scientist event. She worked for six years in science communication and has worked on I'm a Councillor (the forerunner to this event) for five years. She has a Masters in Science Communication from Imperial College, which included training in museum development and evaluation at the Science Museum and Natural History Museum. Sophia conducted interviews with six teachers and five scientists.

3.1 Scientists

3.1.1 Heidi Dvinge

PhD student in Bioinformatics
European Bioinformatics Institute, University of Cambridge
Group: GCSE, Group 1
Previous engagement experience: Worked with SET-routes scheme in her native Denmark, eg school visits.

For Heidi, I'm A Scientist (IAS) was a supplementary approach to other forms of science communication. For her, the advantages of IAS were that it was an easy way for one scientist to communicate with lots of schools across the country, and easy for schools to communicate with several scientists at a time. Heidi also felt that the IAS format was a break from the 'normal' style of teaching which allowed her to communicate with students in depth and over a longer period of time than she would do normally at a more traditional science communication event. "If I go into school and do outreach I go once and that's it, whereas here it's a **longer process** and I can follow up on their questions."

Heidi learned a lot about what aspects of science the students were interested in and, having not gone through the English school system herself, now has a better understanding of what a student in England would be expected to know about science at this level.

She felt that over the course of the event the students' level of science knowledge changed, and also their ideas about scientists and science in general changed. From some of the questions she was asked (for example 'What inspired you to become a scientist?', 'Do you ever get bored? and 'Did you always know you'd be a scientist?') Heidi felt that the students did not have a clear idea about what a scientist is. However, "Being asked questions like 'What's your favourite part of science?' and 'What's your favourite part of the day?' were a nice reminder about what got me started in science."

The live chats were a very different way of communicating for Heidi as the questions came through rapidly and there was no face-to-face contact. Some days were very hectic with a number of chats booked, and she was often asked almost identical questions from different schools. Despite being **initially sceptical** Heidi found the sessions **very useful** "The students enjoyed the live chats and they worked well. They had the choice to interact with one of us or all of us so the chat session was more useful than I'd anticipated."

In Heidi's opinion, the students asked more questions than they would otherwise be able to do, and did so with more confidence than they would have done during a traditional classroom outreach event. Although she found it hard to answer questions that required more discussion and dialogue (such as "When do you think life begins?") during the live chats, Heidi felt that lots of schools were very engaged and as such booked a number of sessions. This allowed her to build on responses to previous questions. Some students had not met a scientist before and so having a scientist communicating with them made them keen to stay on to chat during their lunch breaks.

Heidi found the IAS information pack useful as it meant she could see the teachers' notes and lesson plans. This gave her an idea of what sort of questions would be put to the scientists and meant that she could prepare some responses. She also found the briefing note about the website useful, although she would have liked more information about what she could do with her profile, such as uploading photographs about her research.

Heidi thought that next year it would be helpful for the scientists to receive comments from teachers who participated this year about what they found useful about the event, and also information about the teachers' objectives for the event. This would enable both the teachers' and scientists' expectations of the event to be managed.

Interviewed by Yvonne Harris

3.1.2 Ian Walker

Traffic and Transport Psychologist
Lecturer at the University of Bath
Group: GCSE, Group 2 (Winner)
Previous engagement experience: Various – demonstrations, science week events, school visits, media experience (Dr Walker's research on driver behaviour around cyclists was extensively reported).

Ian felt that science communication activities such as I'm a Scientist (IAS) were the type of thing he and his colleagues should be involved with in order to communicate with the next generation of scientists. "It would be great if we end up teaching them in eight years' time and they have the right ideas of what to expect from science." Because IAS was designed specifically with young people in mind, Ian thought that the students he talked to were clearly engaged.

Ian had no real expectations of IAS but hoped that after talking to the scientists the students would have a broader understanding of what goes on in science, and that they would understand that science is done by everyday people not unlike themselves.

It was notable to Ian that lots of the students tried to get the scientists to justify what they did for a living, the career choices they had made and what they would spend the prize money on if they won. On some occasions misunderstandings arose, particularly during the live chat because of the 200 character response limit which meant that it was hard to address the questions being asked. For example, students found it hard to understand why a scientist would want to spend the prize money on going to a conference.

However, Ian felt that the live chat was an integral part of the event and should be kept in future IAS events, especially as the students liked it so much. Furthermore, the question and answer aspect of the event provided Ian with time to think over his responses and to reply in depth.

Ian tended to be asked questions that fell into two areas: road safety and psychology. In both cases he thought that the students **learned something new**. Ian got the impression from talking to the students that there was a huge appetite for psychology from this age group despite relatively few schools offering psychology as a GCSE.

Ian tried to convey to students that there is a wider side to science beyond physics, chemistry and biology: "There's a sense that this [physics, chemistry and biology] is science and it excludes everything else. It's not helpful in terms of science communication to say this is science and this isn't full stop. You can take a scientific approach to geography, or even the English language." IAS also made Ian think about how scientists describe science to others, as quite often "…science can give an erroneous message that it's all about facts rather than a method."

IAS was **nothing like** previous science communication events Ian had been involved in with similar age groups (such as demonstrations, science week events or summer schools at the university), the main difference being that IAS was remote from the students whereas previous events had been face to face. Also, the type of questions students

asked were different "The questions were very free, whereas previously they would specifically relate to the demonstration I was doing or what I was talking about."

Interviewed by Yvonne Harris

3.1.3 Liv Hibbitt

Post-doctoral Researcher in Gene Therapy
The Wellcome Trust Centre for Human Genetics, University of Oxford
Group: Sixth Form (runner up)
Previous engagement experience: Various – eg visiting schools, or student visits to her lab.

Liv participated in I'm A Scientist (IAS) to gain experience in communicating her work to lay people, and as a result she felt she is now much better at explaining it. "I finally managed to explain my work to my Dad in a way that he understood!"

In the past Liv has participated in other science communication events, for example classes come into the Wellcome Trust Centre for Human Genetics and scientists lead the groups in lab work. However, Liv found IAS more engaging because its format allowed students to talk to the scientists as real people: "If you go into a school you're already set apart from them as you're leading the group, but here you can chat to them as if you are one of them and they can ask you anything. As a result they ask a wider range - and more - questions than you'd be asked in a classroom." IAS also gave Liv a good opinion of students: "I tend to think that anyone under the age of 20 isn't interested [in science] and doesn't want to talk about it, but actually they're **intelligent and engaged**."

Most of the questions Liv was asked were intelligent and related to her work. Because Liv was communicating with a sixth-form class they already knew about genes, but she was able to teach them a little about gene therapy. She thought hard about how best to explain her work. She tried to gauge a student's level of intelligence from the way their question had been phrased, and tried to reply accordingly. The students were also keen to find out about university – what it was like, which one to go to and how long a course might take. Although occasionally the live chats turned into 'MSN chats' with students sending messages amongst themselves that were unrelated to the scientists and their work, Liv praised the moderators for quickly getting the chats back on track.

Liv thought that the IAS was a good event to take part in because it was a lot of fun and because it also meant she did not have to take much time out of her lab work. She would definitely **participate again** despite not enjoying the evictions. "I was surprised by how much I cared about [the evictions] especially on the first day, as I didn't want to be the first one out."

Interviewed by Yvonne Harris

3.1.4 Trevor Cox

Professor of Acoustics
Salford University
Group: 6th Form
Previous engagement experience: Chaired three debates for Nowgen, presented series for Teachers TV, Principal Investigator on EPSRC projects with adults and young adults.

For Trevor the learning experience was in trying to think how to explain things so it was accessible to Sixth Formers, especially quickly and briefly (as in live chat). Also, learning to use the chat medium in general was interesting. He enjoyed taking part.

He would have liked Q+A to be more structured and got more feedback from students - did the answer address their point? Did it make sense? Perhaps have more threaded discussions. Also, where questions were to all scientists, he'd have liked to have them all on the same page so you could see all the answers together – more of a conversation.

He thought what students gained was seeing a more human side to scientists – they are normal people! His main motivation for taking part was that he thought it was interesting to test out a new way of interacting between scientists and students. He felt this worked well, but would like to know more from teachers and students how effective it was for them.

Trevor has done an HSW TV series for Teachers TV which felt very 'broadcast' – one-to-many, no interaction or feedback, no role for the viewer. IAS was, by contrast, very two-way and had lots of interaction, but he felt you did lose content that way – you couldn't get as much science across. But he felt on balance that was a reasonable price to pay.

Interviewed by Sophia Collins

3.1.5 Sam Mugford

Plant biologist
John Innes Centre, Norfolk
Group: GCSE, group 1
Previous engagement experience: Art/science projects in local schools

Sam found it really enjoyable overall – he expected kids wouldn't be interested, but they were. "Some kids had obviously **gone away and read up on my area**. They came back and asked specific questions. I was surprised by that."

He thought it was a great format and felt the information he was sent did prepare him enough, although he still didn't quite realise what it would be like!

Chat

"Chat sessions were so hectic, but great."

Sometimes Sam wished he could have longer, or could go back later, to chats, as some students didn't get answers to their questions.

However, he wouldn't really want a permanent record of chat – it's an immediate, messy medium, and sometimes he'd give an answer which he thought would be helpful, or understandable, but may not be 'scientific' enough for him to want it saved for posterity (or experts in the field to read).

He sometimes found it difficult to know what level to pitch things but IAS gave him lots of practice. He appreciated the amount of immediate feedback he received in live chat.

Outreach

Most scientists now appreciate the importance of outreach, and it's looked on favourably for job and grant applications. Sam's boss is very positive about outreach and was supportive. She and **other colleagues would watch** the live chat, and enjoyed it. Comparing it to other outreach methods – "how else could you have almost one on one contact with so many young people, all over the country?"

He felt the possible barrier for other scientists might be time commitment. IAS took up quite a bit of time, which is most relevant for post-docs who are under pressure to publish. He thinks junior scientists may be motivated by the CV points, but more senior scientists less so. He thought that to get the full seniority range participating, IAS would need to target those with an interest in engagement.

Interviewed by Sophia Collins

3.1.6 Maria Tennant

Research Biologist and Clinical Study Coordinator
Unilever
Group: GCSE, group 2
Previous engagement experience: Careers talks in schools, studying part-time for a Diploma in Science Communication.

Maria thought I'm a Scientist (IAS) was a great idea, but it was a big time commitment. Taking part - especially having to explain and justify things - made her think about what she does and why.

It was also lots of fun – "I enjoyed it more than I thought!"

She felt students got to see that scientists were human and gained a sense of them as day-to-day people. Students also learnt much about her area of work and the kind of thing it involved day-to-day. They didn't know much to start with but asked plenty of questions about it, and the questions changed as the event went on, so she inferred they'd learnt something! For example, quite a few students were surprised that scientists do clinical trials for products – not just drugs.

Maria was surprised by some of the questions – there was a real range, from silly/personal ones to stretching science or ethical ones. "[IAS] seemed to make the kids think about ethical issues."

Her main previous science engagement experience was giving careers talks where "you talk at them". IAS was more **interactive**: the students had a say, and were familiar and comfortable in the medium.

As a result of IAS Maria says she will make her careers talks different now! She wants to make them more interesting and far more interactive, now she's seen how effective that can be.

Interviewed by Sophia Collins

3.1.7 Nicola Harris

Trainee clinical scientist in medical physics
King's College Hospital, London
Group: GCSE, group 2
Previous engagement experience: Organised a stand for Kensington school scientific fair.

"I really, really enjoyed it. I loved the live chats, especially the enthusiasm of the kids."

"It was **good practice at communicating**. It was my first experience really of explaining about what I do to people who don't already know about it and understand what I'm saying. I had to examine my own thought processes and work out what I meant by things in order to work out how to explain them to people. It was a really good experience and helped me think things through."

She hopes that young people gained an idea of the breadth of jobs available in science, and what some of the possibilities are. "When I was at school I had no idea that jobs like mine even existed."

She felt that students did seem to learn about her area through talking to her. They started off saying, "But isn't radioactivity bad for you and gives you cancer?" but then would be saying, "I see, so a small amount can kill the cancer cells, but not the other ones?"

Nicola was surprised by the students' enthusiasm and interest in science. "I'd expected them to be just trying to get us to do their homework for them, but they asked about all sorts. They seemed to be genuinely interested in finding out more about science."

She felt communication was good, and she knew what to expect. She liked getting a copy of the teacher pack, so she could see what they would have been doing in class. Particularly, she thought it was a great idea to have the site up for a week before the event started, and have a drop-in chat session in scientistzone. This meant that when the students all started and it was so hectic, she already felt confident that she knew how things worked and where they were.

Nicola would definitely be up for doing it again in future. "I though it was a really good idea. **I'm really glad that someone's doing things like this for kids**."

Interviewed by Sophia Collins

3.1.8 Jenny Barnes

Climate researcher
Mullard Space Science laboratory, Surrey
Group: GCSE, group 1 (Winner)
Previous engagement experience: Travels to schools with the Meteorology Ambassador Scheme.

Jenny felt taking part in the event was very worthwhile and it was a great way to reach lots of students in one go. "It would take you all day usually to visit one school, I could do this from my desk."

Compared to school visits, which may only involve an hour in the classroom, Jenny pointed out that IAS takes place over a much longer time. "There was **more thinking time** for the kids. They could read the profiles, go away, digest it, talk about it, and come back to ask you questions." Jenny pointed out that repetition – coming back to the same thing several times - is really important for learning and understanding.

She loved the live chats, "you could feel their enthusiasm." Although they took up a lot of time – one day had four live chats which took up most of four hours.

She thought the questions were very good. There were some questions where students had obviously gone away and done research on her area, and discussed things themselves, then come back and asked questions about things. One example that sprung to mind was a question on weather modification, which is certainly not on the GCSE syllabus.

She found the students were very sceptical about man-made climate change to start with, which she puts down to misinformation in the media. She feels that many in the media are stuck with (and propagate) an out-of-date view that scientists are divided on global warming, whereas now pretty much all climate scientists are convinced it's happening.

"The kids don't usually get a chance to talk to someone who's looked at the data." That's why she sees such a great value in doing these kinds of outreach. "They were sceptical to start with but most of them were won over when they heard the evidence."

Most of Jenny's experience has been in primary schools so she found it really interesting to see what level Year 9s were at. Plenty of them asked her about how to become a scientist, and seemed very enthusiastic.

The main problems were IT related. She was often logged out, or wouldn't be able to post and then had to log in again. Chats were sometimes slightly too undisciplined. She didn't mind them being hectic and a bit chaotic, but in one or two it seemed as if the teachers had no control at all and the chat didn't seem very useful.

Interviewed by Sophia Collins

3.2 Teachers

3.2.1 Oak Lodge Special School, Barnet

School information

Teacher:	Mairead Ulamoleka
Type of school:	Special school
Year group:	Year 10
Subject:	Entry Level Certificate Level 3
Ability:	Mixed, moderate learning difficulties and autistic spectrum disorders
Number of students:	13
Time spent on website:	1.5 hours
Times visited website:	5

Key points

- Students were very engaged by the live chat
- Students **talked about science issues**, which they would never have done prior to participating in I'm A Scientist
- Feeling that their opinions mattered was important to the students
- Communication with scientists was good, and their quick responses impressed both the students and teacher
- Lesson plans were **adaptable** for use with students attending a special school
- Building in time for teachers to get to know the site in advance of the main launch would be useful

The teacher, Mairead Ulamoleka had previously debated issues in the classroom in a mainstream school, and felt that I'm A Scientist (IAS) was a good opportunity for her current students to become more confident in their debating skills. She had two objectives for participating in IAS. The first was for her students to understand how science works in the real world. As Mairead felt that her students' opinions are often not as valued as other peoples', her second objective was to use IAS as an opportunity for her students to voice their opinions.

Because of her students' needs and ability level Mairead did not use all of the lesson plans or any of the information sheets that were provided. However, she felt that it was still beneficial to have received the plans. Initially the whole class had a lesson on the role of science, and they used the IVF cards (lesson 2: IVF Debate) to do some debating. Later in the event, in order to vote, the class had to be split in two because a proportion of her students needed one-to-one adult support on the computers, so while half the class were voting the other half got on with a different activity. Mairead thought that it was good for her students to be able to interact by voting even if they did not want to ask any questions themselves.

The speed at which questions were asked and answers were received worked very well for this group, and so the students were very engaged by the online live chat (lesson 4) "They were shocked when they got a response right away from a scientist!" Also, because the scientists had the opportunity to talk about themselves personally, the students got to realise that the scientists were 'normal' people.

Having the site up and running slightly earlier would have been better from the teacher's point of view, as this would have given her the opportunity to go through it and try it in advance with one or two students so that they were able to use and navigate the site before the whole class joined in. At Oak Lodge they do not have as many lessons as in a mainstream school, so if they did not get through all of their IAS work in one lesson it was not always possible to carry it over to the next. Also, quite often the students' reading ability was at a lower level than in a mainstream school so an adult had to read the information on the IAS site to them. For this group, having an audio voice-over of the text would have been incredibly useful.

Communication with Gallomanor was felt to have been very good, both before and during the event, and Mairead appreciated being kept up to date on everything by email. She also thought the teachers' packs were excellent and liked the shocking pink colour of the folder "Even though there's always a mess on my desk it stood out, which made life easier." She also felt that communication with the scientists was good and, like her students, was impressed by their quick responses.

The role of scientists and the IVF debate were the things Mairead thought her students learned the most from; for example, the students were heard talking among themselves and to teachers about science issues, which is something they would never have done before. Feeling that their opinions mattered was also very important to the students – the overall voting pattern reflecting which scientists they had voted for is a good example of this.

Interviewed by Yvonne Harris

3.2.2 Riverside College, Cheshire

School information

Teacher:	Lynn McCarroll
Type of school:	Tertiary college
Year group:	Year 12
Subject:	BTEC National Diploma in Applied Science
Ability:	Mixed
Number of students:	14
Time spent on website:	3 hours
Times visited website:	5

Key points

- Students' view of what science is was widened and made more realistic
- Lesson plans provided the teacher with useful tools for debating in the classroom
- The trial and real live chats **improved students' debating skills**
- Students were engaged and enthused by their communication with scientists
- The event fitted in well with Applied Science curriculum timetable
- An additional scheduled live chat would have been helpful as this was the part of the event the students got most out of
- Students tended to believe what the scientists said even when this was not their area of expertise

The teacher, Lynn McCarroll, felt that participating in I'm A Scientist was important because typically students do not have much of an idea about what science and what scientists do. "My students are all BTEC forensic science students and they have a warped sense of what science is about. It doesn't mean anything coming from me, even though I've been a scientist." Furthermore, Lynne thought that IAS could help to give more direction and meaning to the debates and discussions she had in class with her students.

The IAS format worked well with this group of students. Lynne used the IVF debate (lesson 2), and two information sheets: 'What's the truth about nuclear power' (generating energy) and 'Is our food safe?' on pesticides/data handling. She also used the first lesson plan 'You're the judges' which the students used to choose and rank the criteria by which to judge the scientists. This provided Lynne and her students with plenty of scope for things to talk around. "Afterwards it seemed obvious to talk about what science is and does, and I will use this in future." During a practice 'live chat' (lesson 4) they discussed the criteria for why a scientist should win. The students felt strongly that the scientist should win on the merit of their work rather than their personality. However, through their interactions with the scientists the students' criteria changed as they realised how important personality was, especially with regard to how much effort the scientists made to interact with them.

Knowing that someone was interacting with them 'on the other side of the computer' (lesson 4: Live chat) meant that the students soon overcame their shyness and started asking questions. It also meant that it was easier to ignore some of the more dominant characters in the class because their contributions were limited to a sentence that appeared on the screen rather than them being physically vocal in the classroom. "The students came into lessons with a buzz, and in the computer room they were enthusiastic

about responses to their questions and wanted to tell me about them." Lynne felt that given more time she would have spent longer helping the students to better structure their questions, as they were not always sure what questions were suited to the project. "The students assume that scientists are very clever and know the answer to everything, and it wasn't until the live chat that they started to appreciate that this isn't the case." However, the students still tended to take the scientists' answers to forensic science questions as fact even when this was not their area of expertise.

Overall the live chat was a highlight for the students and Lynne would have liked to have had an additional live chat because this was the part of the event the students got into the most. She also felt that because the students sometimes did not always have a huge level of comprehension about the scientists' areas of work, the live chat gave the scientists the opportunity to go into more detail about their projects. "Even though they're science students it sometimes goes over their heads… but the live chats enabled scientists to put flesh on the bones." Lynne praised the scientists for being quick to respond to all questions and giving friendly replies despite the rapidity at which questions were asked during the live chats.

No homework was set on the event but because the students were already doing work on 'core perceptions of science' and assignments on how science could be more interesting **IAS slotted into the timetable very well**. In order to undertake follow-up work in the classroom, transcripts of the live chats would have been useful, particularly for those students who were weaker at literacy.

Lynne felt that IAS has improved her students' thinking skills, and doing a trial live chat before the real one helped to improve their debating skills. In particular the students learned that scientists "are not in ivory towers and they do interesting things, like diving and travelling, and they're not in their lab at all hours." Although the majority of the students were already interested in science, seeing what other scientists do widened their view of what science is: "It's wider than CSI and just doing chemistry analysis in a lab, and at this stage they still have the opportunity to go into other science fields."

Interviewed by Yvonne Harris

3.2.3 Ysgol Tre-Gib, Llandeilo

School information

Teacher:	Liz Howell
Type of school:	Welsh Comprehensive School
Year group:	Year 9
Subject:	GCSE Core Science
Ability:	Top set
Number of students:	30
Time spent on website:	2 hours
Times visited website:	3

Key points

- IAS was a useful resource for **stretching and challenging** top set Year 9 students
- Initially some male students dismissed some areas of scientific research as being of less importance to humans than others
- Over the course of the event students came to appreciate that there are many valid areas of scientific research
- **Role playing** enabled the students to **absorb more information** about the scientists than they would have done just by reading the information
- Additional live chats would have been appreciated as this was the part of the event the students got most from
- The teacher would have liked the class to have been able to communicate with all five of the scientists during the event
- Some students voted for the scientist with the highest profile

The teacher, Liz Howell, had just finished her graduate teacher programme and was proactively looking for resources to use with her top set, in order to stretch and challenge them beyond the curriculum. She had previously used resources such as 'The Simpletons', which gives different viewpoints. Liz's objectives for I'm A Scientist (IAS) were met; she said that all the class were interested in and excited by I'm A Scientist because they were trying something new and got to discuss issues as well as interacting with the scientists "Now they would **leap to give their opinions** whereas before it was like pulling teeth."

Liz liked the introductory activity (lesson 1: You're the Judges) because it helped guide the students in how to question things. Liz used the resources for lesson 3 (Meet the Scientists). To familiarise themselves with the scientists they would be interacting with, the students did role-play work in pairs. One of the students in each pair took the role of a reporter and the other a scientist, and the pair used one of the real IAS scientist briefing sheets in order to be interviewed about 'their' work. After the role-play each of the 'reporters' had to report back to the class. Each pair did three or four of these small role-plays during one lesson. Liz felt that this approach made the students think about the scientists and their work a lot more than they would have done by just reading the information. Interestingly, Liz observed that initially during lesson 3 the boys immediately dismissed the cosmetic research and focused on the scientists working on cancer cures on the basis that this work was more important to humans than, for example, salmonella research or road traffic research. Over the course of the event the boys' **opinions changed** as they began to understand and appreciate that there were

other valid research topics in science besides finding cancer cures. Liz also used the online opinion quiz in class (lesson 5: Interactive quizzes), which led to some spin-off work where the students looked at 'science in the news' content from newspapers. In addition, Liz set the class homework tasks to ask questions on the site, although she admitted that some students participated more than others.

Liz praised the online aspect of IAS, saying it "added another dimension" to the resource, and was suited to the age group because children of that age tend to be very computer-literate. However, because only one of the science classrooms had online access, the class had to use the computer suite to participate in the live chat (lesson 4). Liz initially showed the group how to use and navigate the site, and then left them to use it themselves, but monitored their live chat.

"The first thing that happens with the brief is that you want to know more, but that's your opportunity to ask questions" was Liz's response to using the scientist briefing sheets with her students. She felt that her class gained a lot from talking to the scientists about how they worked and what they did, especially during lesson 4 (the live chat). "They got most from the live chat. They enjoyed it. Some asked sensible questions, some asked random questions. It must have been hard for the scientists to keep up!"

Ideally Liz would like to have been online with her class every day that the event ran. Liz thought that the class had spoken to most but not all of the scientists, and they had spoken to one of the scientists twice. However, Liz was unsure of what could be done to ensure that it was possible to communicate with all of the scientists during the event.

Initially some of the students had expected the participating scientists to be rocket scientists or cancer researchers and they were surprised by some of the research that was taking place. During the voting, approximately six of the students voted for Ian to win. Ian's work on cyclist-driver interactions included him dressing up as a woman, to test whether drivers behaved differently around female cyclists. This research had been reported in the media and several students had heard vaguely about it before the event. Liz thought it was predictable that the students tended to vote for the scientists with the highest profile. It was only once they discussed this as a group that the students realised this is what they had done.

Liz felt that IAS made her students more vocal, but that they also learned to better structure their thoughts and think in a more analytical way about science issues. Her students now have more confidence in **discussing controversial science issues** and are willing to look beyond their own points of view. The class were a top set, studying triple science, and many students already had scientists in their family. These factors meant that Liz was unsure that IAS had inspired this group to think about a career in science more than they would have done without it, but she would like the opportunity to repeat IAS with a lower ability group to assess whether their level of inspiration could be raised.

Liz described the communication with Gallomanor very positively: "Every time I saw I'm A Scientist emails I read those first. I liked the blog because it kept you up to speed before the event. Having a blog make it OK that the event would happen." She also praised Sophia's communication with the teachers: "She was talking to lots of teachers but if felt like she was talking to you personally. I felt involved and not just a participant."

Interviewed by Yvonne Harris

3.2.4 Longsands College, St Neots, Cambs

School information

Teacher:	Chris Millington
Type of school:	Foundation Comprehensive
Year group:	Year 12
Ability:	Mixed
Subject:	AS Chemistry/A2 Chemistry
Number of students:	12
Time spent on website:	1 hour
Times visited website:	Once

Key points

- IAS provided AS and A2 Chemistry students with useful skills
- Students applied ideas learned in one IAS lesson to the next
- Students came away feeling that scientists are 'real' people
- The resources **opened up new ideas** for teaching in the future
- Event timing was the main barrier to greater levels of participation
- In future emails need to be prioritised using a flagging system

The teacher, Chris Millington's objective for participating in I'm A Scientist (IAS) was to give students studying a traditional science course a new experience. "Especially at A Level there's a focus on getting through the curriculum and not discussing science issues, how funding arises, politics, ethics, and so on… whereas on the Applied Science course they tend to get speakers in."

After the event Chris felt that IAS did give the students a very **different experience** to that which they were used to. He felt that the event had a clear focus: "The students got a different but very useful type of lesson that will equip them with some useful skills that they can use, for example, at interviews."

Chris thought that the ease of access and the quality of the resources worked really well. Although the administration associated with individual student logins was "a bit of a faff" he appreciated that it made IAS personal to them. Chris described the quality of the resources as "excellent" and "pitched at the right level". He also liked being sent things on paper. The debate cards (Lesson 2: IVF debate) were described as "very helpful and a good 'way in' across all abilities". The role play (again the IVF debate) he described as: "Easy for the students to relate to and good to put themselves in the place of someone else." Chris felt that the resources had opened up new ideas that he would use with Key Stage 5 classes next year.

The scientists' profiles enabled the students to bond with scientists. The scientists' different backgrounds and the fact that they were 'real' people increased the students' interest in and understanding of science. Chris thought that it would be good if the scientists' profiles linked through to their websites, as this would enable higher ability students to get more out of the event.

Chris thought that the students enjoyed thinking about the judging criteria (lesson 1: You're the judges). "They threw things up that they'd not thought about much in the past – such a funding nanotechnology – and then you could see they'd taken ideas across

from the IVF debate and applied them. They need the ability to think about issues and not be blinkered, and to think about things like the consequences of budget squeezes." Chris also thought that the IVF debate (lesson 2) had helped to improve the students' debating skills. "They were forced into the roles and had to put themselves into a position and take that role on and think deeply and engage critically."

Communication with Gallomanor was described as "excellent!" Chris said he felt very involved in the process, and that communication was always good. However, in future he would like email senders to adopt a flagging system so that it is easy to tell at a glance what emails are critical or relate to technical issues, so that these can be prioritised for reading.

For Chris the main thing that could be improved on is the timing of the event. During the first week of IAS his students were still on exam leave, and so they started work on IAS once they were back. Shortly after that a lot of the students went away on a field trip, which meant that the homework Chris had set them (to find out more about the scientists and to re-read the scientists' profiles) did not get done. Also, because of the timing, Chris did not book a live chat with any of the scientists (lesson 6). However, for homework he asked his students to think of questions they would hypothetically put to the scientists and also to vote online. Again, because of the timing and the field trip, in many instances this homework was not completed. Furthermore, Chris thought that if the event was planned for earlier in the academic year IAS might have a greater influence on what the students chose to study at university, but at this stage they were already thinking about their places and had expectations about what to study.

Interviewed by Yvonne Harris

3.2.5 Winterhill School, Rotherham

School information

Teacher:	Danielle Fox
Type of school:	State, community
Years:	Years 9 and 10
Subject:	Triple Award Science GCSE
Ability:	Mixed
Number of students:	30
Time spent on website:	2.5 hours
Times visited website:	3

Key points

- Students' views of scientists were made more realistic
- IVF debate cards provided the teacher with a useful tool for debating in the classroom
- The IVF debate and live chat improved students' **debating skills**
- IAS is an extremely useful resource for teaching How Science Works in an engaging and informative manner
- Internal timetabling issues meant that students missed out on the second week of IAS, including the evictions
- Through IAS students became more aware of the **wide range of science careers** available to them

The teacher, Danielle Fox, was seeking to bring more How Science Works into the classroom. She commented that traditionally the syllabus focus on How Science Works is through practical lessons, and with very little guidance on how to teach it. She felt that I'm A Scientist (IAS) offered a unique way of teaching this section of the curriculum and "was a great way of thinking about why we need scientists".

Danielle thought that the resource pack was very informative, and she found the IVF debate cards (lesson 2) very useful in supporting her in debating activities with her class. "Sometimes [debating] can be quite dry and schemes of work don't give much idea on it. The IVF debate was fantastic because of the lesson plans and resources – it was really structured." Although her class generally finds it hard to debate, she found that their debating improved when they used the IVF cards because she was able to assign different roles to different students. "They got to see the different points of view and the whole class got involved." The IVF debate was so successful that the teacher would like to do more debates around it.

The live chat (lesson 4) was well received by the students, despite the fact that not all of the scientists were able to be online for it. Danielle though the chat worked because it replicated how young people in this age group communicate with each other, through online messaging, and because the students knew there would be a scientist at the other end to answer their questions. "They [the live chats] gave students the opportunity to ask questions and to find out what the scientists actually do. They found out that scientists are actually real people!" As a deterrent to asking silly questions she stipulated that anyone whose comments were blocked by a moderator would not receive an access code. Danielle observed her class's discussions about which scientist to vote for following their live chat: "The students came up with some interesting points around the scientists'

areas of work… that whole area of science tends to gets missed. This isn't content driven, there's no exam, **it's just a good opportunity to see what science is about**."

The info sheets (lesson 5: Interactive quizzes) were also useful resources because they covered topics such as reliability and validity, which the students need to learn about in the schemes of work. Danielle thought that these topics were mostly taught in a dry way, whereas the IAS resources were good activities to teach How Science Works, and she would use them again in the future.

Although the event ran well when she taught it, Danielle would have liked more lessons at her disposal because she only had the first week of the event to teach IAS in, and it was during the second week that the voting and scientist evictions took place. She had to pick and choose which of the lesson plans to use, and although she encouraged her students to log-on outside of lesson time and to vote not many did. "There was one eviction per day and I didn't see the class so I had to get their teachers to get them to log on in their own time." Ideally Danielle would like to spend more time than her allotted 6 lessons on IAS and make a greater deal out of the event. "It would have been nice to have some blocks of time, like double periods to spend on it, or devote one or two days to it across the whole year group, so that they could get more out of it, and form teachers could take a role in encouraging students to vote."

The group using IAS were all triple-science students and some were already thinking about going on to do science as a further or higher education course. The teacher thought that some of the students had had their minds changed about exactly what sort of path they might follow because until IAS they had not realised there was such a variety of science careers available to them.

Danielle thought that Gallomanor's communication had been good, and she liked receiving information by email because she would check her email daily anyway. She thought the resource pack arrived in plenty of time to enable her to prepare her lessons, and that there was just the right amount of information for her students.

Looking towards the future, Danielle felt that IAS had the potential to be developed into a resource for a How Science Works week, especially with the inclusion of the live chats. "Lots of teachers struggle to teach How Science Works, but this particular activity [IAS] is brilliant because you don't have to worry about the content. I'm already thinking about how to do it better next year!'

Interviewed by Yvonne Harris

3.2.6 Hetton School, Tyne and Wear

School information

Teacher:	Janet Harland
Type of school:	Community, comprehensive
Year group:	9
Subject:	Double Award Applied Science
Ability:	C/D borderline
Number of students:	27
Time spent on website:	3 hours
Times visited website:	3

Key points

- IAS worked well with a challenging and underachieving group. Taking the group out of the timetable made them feel **special** and had a positive effect on them
- The IAS resources improved the teacher's confidence in debating science in the classroom
- The Live Chat enabled the students to learn about science content in a medium with which they were familiar
- Scientists were good at answering the students' questions in such a way that the students were able to understand the purpose and benefit of the scientists' work. This ultimately affected the way the students voted.
- Internal timetabling issues meant that students missed out on most of the second week of IAS, including the evictions

The class Janet Harland taught I'm A Scientist (IAS) with were a group that she did not usually teach. They had been a challenging group all year and were under-achieving. The objective behind using IAS with this class was to **get them fired up** and to raise their motivation and interest in science. IAS was very successful in achieving this objective and the Science Department were surprised by how well it had worked. "The students were seeking us outside the classroom in the corridor and asking if we were doing I'm A Scientist this week or if we'd be in the computer suite."

Janet felt that the IAS resources were excellent and gave her a comfort zone in which she was able to concentrate on the actual debating rather than worry about content. This helped to increase her confidence in debating science issues in the classroom. The lesson plans she adapted were more for her own benefit and how comfortable she felt in teaching them rather than because the plans were not suited to the students' needs. In fact, **the resources were so successful that the Science Department are going to embed them into their teaching next year for all of the Science staff to use**.

Janet thought that the group learned most about science content from the live chat. In terms of debating skills they learned the most from the first lesson (You're the judges!), and for social skills the IVF debate (lesson 2). The students really engaged with the Live Chat (lesson 4) for two reasons; firstly because the instant-message medium is suited to this age group, and secondly because they were able to communicate directly to scientists in real time. "Instant messaging is part of their world so they ran with it, whereas if I put a scientist in front of them in the classroom it would take longer for them to interact and ask questions." Although Janet thought that the group struggled with

some of the social skills and their questions were less science-based she felt that it was important for them to realise that scientists are 'real people'.

The scientists were praised for being good at bringing their answers to the students' questions back round to their work. "Initially the group were against animal testing, and didn't care about climate change and so on, but in the end half the class voted for Tamsin, the animal testing scientist, because she was able to explain why it's so important to test on animals. It was the same as the climate change scientist who went to Kenya to do some work – they explained it at the kids' level and got them on board."

Unfortunately, due to timetabling issues, the students did not get to vote every day during week two. They voted at the beginning of the week and then the onus was on them to log in and vote during their own time over the rest of the week. Janet put this down to a school issue rather than an IAS issue, but she would like to have had another 'voting' lesson with the class. Regardless of this she still felt that the IAS format worked well. "Our children normally get three teachers a week. For this I took them out of timetable and had them three times. This gave them continuity through IAS and made them feel special, and had a positive effect on them."

Although not her regular class, Janet firmly believed that IAS had improved the group's interest in and understanding of science. "This is the only time this year I've seen this group of students and the difference in their response is that **there's more enthusiasm and it's had a positive impact on their aspirations**… now we have a couple of budding scientists!"

Janet praised Gallomanor's communication with the teachers, especially as she had picked up IAS cold after her Head of Department (with whom Sophia had initially been communicating) had gone off sick. "Sophia was brilliant. I asked her to email me as much as possible, which she did very quickly, and then shortly after the teacher pack arrived. We were kept up to date and knew when the site went live. Nothing was rushed and we had time to go through everything before we started."

"As a pilot I was very impressed by the set up of IAS and the way it works and I would definitely take part again."

Interviewed by Yvonne Harris

3.2.7 Acklam Grange School, Middlesbrough

School info

Teacher:	Sarah Gettings
Type of school:	Specialist college of mathematics and computing
Year group:	Year 9
Students:	Mixed ability class of Year 9 students (levels 5-7)
Subject:	Core/additional/triple GCSE Science
Ability:	Mixed (levels 5-7)
Number of students:	31
Time spent on website:	3 hours
Times visited website:	10

What did teachers get out of it?

"It helped me to put a whole new spin on teaching How Science Works."

There seems to be a lack of high-quality, well thought-out resources out there for HSW. "Anything like this that people have clearly put a lot of work into is great."

She liked the **flexibility** of the event and its resources. She adapted one activity so that students (in groups) had to prepare a presentation on each of the scientists. Her group like research, and it was easy to adapt the event to suit them.

What did the students get out of it?

Live chats were their favourite bit but they enjoyed the whole event. Students were enthused: "They were all asking, who's been evicted today?" The voting made it more real to them.

She liked the fact that IAS introduced variety. "In our school, the Year 9s do no practicals in the period before their SATs, then when SATs finished they are suddenly flooded with them. This gave them a break from that, which was great."

She felt the event showed students that scientists aren't rarefied beings. "It really, really helped them to see the day-to-day life of scientists – including that some of it is repetitive and boring. And that they are real people who get up and go to work, and do other stuff too." This made scientists seem more approachable and science careers seem more attainable.

Debating and discussion

Sarah did a course two years ago on using discussion in the classroom, but despite that she hadn't used the technique much. The IVF debate gave a structure, and made it much easier for her and her students to run a debate.

At first students were confused, "We don't understand, how can there be no right answer?" But with experience they developed their skills.

Sarah thinks it would be handy to do a debate like the IVF one with them every half term. "I don't think we give enough time in school to them exploring their own ideas and opinions."

After being 'trained' with the IVF debate, following the group presentations on the scientists they had a discussion about the scientists' work - the implications, and which they thought was most important. Sarah found this discussion fascinating and surprisingly wide-ranging.

These discussion activities helped her to get to know her students better, and see another side to them. "This group are often a bit quiet. In the discussions I got a real insight into the way they thought."

Interviewed by Sophia Collins

3.2.8 Woodkirk High School, Wakefield

School information

Teacher:	Dan Hannard
Type of school:	Specialist Science School
Year group:	Year 12
Subject:	AS Physics (AQA)
Ability:	Mixed
Number of students:	11
Time spent on website:	4 hours
Times visited website:	4

"The students keep asking when the next one is."

Dan and his class found I'm a Scientist immensely enjoyable – the students found it exciting to be in the pilot of something new. He felt it was much better than most How Science Works resources, because everything was **real**: "In textbooks it will say 'Samira works on a farm and does…' but you know it's not real, so you just don't care. This was different."

Dan and students felt they really got to know the scientists. The personal contact in live chats was great. If he was doing it again he would get students to stay on target more and set more tasks for the live chats – they got a bit random.

The crucial thing was that it was so **vivid** and students realised that scientists were real people. "They found out about what scientists *actually* do all day – that Liv had spilt bacteria down her trousers, or that Nick spends most of his time on his computer, sending emails or waiting for it to process calculations."

This was completely different to things like University open days, which are very contained, and are not attended by all students anyway.

Dan would definitely want to do it again if possible and he would like to involve more classes next year.

Problems?

Asked to suggest what didn't work so well or what he would change, Dan said, "I'm really struggling to think of anything that was a problem." He thought the format was great, number of scientists was right, and the length of time was good.

His only suggestion was to spread voting out more (ie not daily), because students won't have a science class every day and not all have the internet at home. Dan would also have liked more use of TeacherZone – he didn't realise he could use it to talk to other teachers. "Contact with teachers from other schools can be really useful."

Resources

Dan and his class used lesson 1 (You're the Judges) and also did a debate on nuclear power after the event, using the information sheets. Lesson 1 worked particularly well at getting students thinking.

The resources worked 'right out of the box', and Dan didn't have to change anything – unlike other resources which often need tweaking, or leave teachers to find lots of stuff themselves. He said that the IAS resources were well planned and the lessons really worked.

He also liked that the resources were flexible: "Sometimes you get resources which are 'you must do this, and then you must do this in the next lesson, and that next week'… really bossy, and it doesn't always fit in with your class or what you want to do."

He set homework involving finding a news story from the last year that related to one of the scientists' area of work. This brought home to the students how relevant and current the research is.

Communication

Dan thought communication with Gallomanor before and during the event was very good and that he had all the information he needed. "I've felt very involved in the whole thing and I've felt that my input has been valued. Thanks."

Interviewed by Sophia Collins

3.2.9 Heanor Gate College, Heanor, Derbs

School information

Teacher:	Sally Ann Fox
Type of school:	Foundation, comprehensive, science and vocational
Year group:	Year 9
Subject:	Science GCSE (AQA)
Ability:	Mixed
Number of students:	60
Time spent on website:	2 hours
Times visited website:	"Varied according to activity"

Sally Ann thought the event brought science to life for her students. "Talking to people who are actually doing science makes it real."

Knowing that the scientists were real people made her students think seriously about real-life applications of science, and what scientists do. Science came alive; it wasn't just an arbitrary, abstract concept any more.

She thought the website gave her students more direct communication with the scientists than a school visit does, and accommodated for a larger group than a science workshop.

Sally thought communication from the event team was good, and she knew what to expect. In her final opinion, though, Sally is less enthusiastic than the other teachers. She concedes that she missed some lessons that the supply teacher taught, and that that might have affected her experience. Presumably, we can't make I'm a Scientist work like magic for every class and every circumstance. It's also true, generally speaking, that the keenest teachers participate most and send the most feedback.

Problems?

Timetable problems, school trips, etc, meant that her group's participation was bitty. They weren't always focussed.

Sally would have liked for all the scientists to have turned up together for a chat, at least once. Some scientists didn't speak to her class at all.

There were some technical issues: problems with log-ins, and a strange glitch which allowed one student to log in as 'guest' and be able to speak in live chat. This student was then very disruptive, but couldn't be blocked.
(This was an unexpected glitch we haven't seen before or since, and can't reproduce. The 'guest' account should not be able to chat or ask questions.)

Resources

Sally reports that the IVF debate worked well. Her students realised that there are many ways to approach and discuss a given issue.

The criteria task (Lesson 1: You're the Judges) worked well with one of her groups, but the other group didn't focus on it.

Sally liked that she could adapt the resources to the needs of different groups.

Interviewed by Sophia Collins

3.2.10 King Arthur's School, Wincanton, Somerset

School information

Teacher:	Michelle Crooks
Type of school:	Community, comprehensive
Year group:	9
Subject:	GCSE Core (AQA)
Ability:	Mixed
Number of students:	30
Time spent on website:	3 hours 20 mins
Times visited website:	About 8

Michelle thought I'm a Scientist was "absolutely fantastic! I was ranting to my colleagues about how great it was and they were all jealous."

She says the event (and the resources) were a different way of delivering information. "It was an eye-opener for me that you can teach like that and trust them to find things out for themselves." What makes the event great, she says, is that it **trusts students** to talk, independently, about what they've learnt. "We don't give enough space for that in school."

For example: during the IVF debate one student asked Michelle how much a round of IVF cost and she said she didn't know. Another student had the card where that was the 'IVF fact' and called out, "I know Miss, it's £2,500." "It made such a difference that we were finding things out together. And far more memorable for the kids."

Michelle thought it was good to have a variety of scientists – students realised that science in the real would is a lot more varied than they thought. Several students have started **asking questions about science careers since the event**.

Resources

Michelle loved the integration of the whole event – the logos, pink folder – "Whichever bit they were doing, as soon as they came into class and saw the logo they knew it wasn't going to be a 'normal lesson'."

Students absolutely loved the Criteria task (Lesson 1: You're the Judges): "One of our best lessons." Students got to really talk about stuff, explore, and apply what they'd learnt.

Says Michelle: "I realised we don't do enough debate and discussion." But it can be difficult just asking students to come up with opinions from cold. The IVF debate (Lesson 2) prompt cards provided a structure, gave students somewhere to start, and showed them how to get debating.

Michelle's class did a debate on nuclear power the next week (using the information sheets supplied) and students clearly carried over the skills from the IVF debate. "They've been trained to structure and back up what they are saying."

Michelle felt the resources were comprehensive - "Everything was there that I needed" - and that instructions (for teachers and for students) were very clear.

Live chat

Michelle saw really great questions "even from kids I wouldn't have thought would be interested."

She says it was exciting - "People passing the window were wanting to see what they were doing and join in. It was easy to keep [the students'] attention. Normally they start putting their coats on five minutes before the end but [when doing the live chats] they were in their chairs still after the bell went."

Students would ask, "Do we get to do a chat today?"

She found some quieter students became more confident online and she was surprised by how strong their opinions were. One girl in particular is very shy but talked a lot in chat. "It's had a big effect on her that the scientists were taking her seriously and answering her questions."

Interviewed by Sophia Collins

3.2.11 Sherwood Hall School and 6th Form College, Mansfield, Notts

School information

Teacher:	Kirsty Price
Type of school:	Community, comprehensive
Year group:	Year 9
Subject:	GCSE Core Science (AQA)
Ability:	Mixed
Number of students:	35
Time spent on website:	4 hours
Times visited website:	4

Taking part in I'm a Scientist made Kirsty's students feel important. "At first they just didn't believe that real live scientists were talking to them and answering their questions. Some kids were going and looking up science questions to ask them to see if they could catch them out."

It took science 'off it's pedestal', showed that these are real people. Science is achievable for students too.

Since the event some of Kirsty's students have been saying: "I want to be a scientist." Students have a far more positive view of science and science careers, but also a more real view – "They can see that there are other options out there than being a nurse or a policeman, and scientists aren't all Albert Einstein."

Online medium

The fact that it was a medium students were used to and liked meant I'm a Scientist worked well. One result was that quieter students gave more input: "I saw that they had strongly held opinions and saw a different side to them."

Kirsty loved the personal touch about the event. Jenny (one of the scientists) came over particularly well in live chat – the students felt she was a real person and that her work was important – and they all voted for her.

Resources

Kirsty felt they worked well. She could use them straight away without any extra work. Lesson plans were really clear, at-a-glance.

Debate and discussion

"So much we just fill them full of facts but don't give them a chance to explore that."

The IAS exercises were **good preparation for GCSE** because instead of just being based on learning facts, students had to come out with opinions and back them up with evidence. "It really promoted higher thinking skills."

"[IAS] definitely increased their debating and discussion skills. It also increased my confidence in doing those activities with them."

She was pleased to see that the IVF modelled what students should do: "You can't just expect kids to come up with an opinion and back it up straight away." The students got involved in debating and discussion with every part of the event, all building those skills together.

"At first all the lesson plans and activities were a bit confusing, they all seemed different. But as it went along it all got clearer and I could really see how they worked together."

For example, during the Criteria lesson (Lesson 1: You're the Judges) students formulated an opinion in the discussion, which gave them a place to start with talking to the scientists – questions to ask, etc. They changed those opinions as they went along, but having somewhere to start from made it easier.

The future

Kirsty would love to do it again, with more classes.

She would like all students to get something for taking part – maybe a certificate celebrating how they've participated, developed higher thinking skills, and exercised democratic responsibility. She suggested that if IAS put templates on the site, the school would happily print them out – at a low cost to the organisers but high added value for the schools.

Kirsty felt the organisers could charge for resources and/or taking part in the event: "It's definitely worth it." She pointed out though that Academies with spare cash might be able to afford it, but not all schools could… "and not everyone would realise how much it was worth it, without having done it."

Interviewed by Sophia Collins

3.2.12 Sacred Heart High School, Hammersmith, London

School information

Teacher: Pam Large
Type of school: Voluntary aided, Catholic, comprehensive girls school
Year groups: Year 9, year 10
Subject: Year 9 – Edexcel Core Topic 5/6; Year 10 Edexcel Additional Topic 5/6
Ability: High
Number of students:
Time spent on website:
Times visited website:

"I was surprised how instantly it engaged the students. I didn't need to do any bigging it up, they were interested straight away."

Students liked the colour and layout of the website, seeing the photos of people, reading about their work, and also their hobbies and favourite bands. The students' immediate response was: "They're just real people."

"What struck them was that the scientists were all really different, there wasn't a stereotype."

"I was very, very impressed."

The girls started off saying, 'Oh, she looks nice', but then as they read more about the work and what people had said, they started applying more in-depth criteria. They liked having a say but weren't particularly fixated on the voting. They found it difficult to choose between the scientists – they didn't have strong favourites.

Classroom resources

Pam didn't have as much time as she would have liked for the event, due to timetable clashes, exams, etc, so didn't use many of the information sheets or lesson plans. She writes for upd8 and tests resources on her classes first, so her classes are pretty up to speed with HSW and do lots of debate and discussion.

She thought our resources were nice and simple, "You opened the pack and could just see straight away what to do," unlike other resources which are much more complicated and require teachers to spend a day going through them to work out what's going on.

IVF debate

She did use the IVF debate with year 7s and thought it worked brilliantly. They were a mixed ability class, but quite sparky and with some very bright kids who "pull the rest along". The cards were pitched at just the right level, with the right amount of information coming out as you went along, and the right amount of structure. And the instructions were nice and simple to follow.

Pam had used DEMOCs in the past and found that very complicated. She was one of the testers for it and had seen it in operation twice before running it herself, so she knew

what to do. But it is overly complex and takes up a lot of time, so when she runs it now she misses out some of the stuff.

She felt the IVF debate was much more manageable – both teacher and students could see straight away what the class had to do, and the debate went really well. "We've put it in the timetable now. The IVF cards are laminated and stored away to be used next year."

What did students get out of IAS?

"They loved getting answers to their questions straight away from *real* scientists."

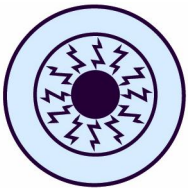
Again, Pam stressed the word real, as so many teachers have. Her students couldn't quite believe that real scientists were stopping their research to talk to them. "They would come into school very proudly with the answer to *their* question all printed out."

Pam feels that young people have an idea of what it means to work in an office, say, because they see that on the television. But she feels there are far fewer representations of scientists – except for forensics - and the portrayals are quite unrealistic. "Except perhaps Time Team, and most students wouldn't think of those people as scientists."

"What they gained was not so much learning exactly – would you call it learning? A much more positive viewpoint of science, an internalised idea of what being a scientist is and what scientists do."

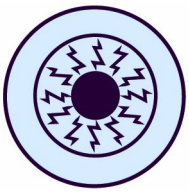
"I think it has made them consider careers in science more because it's made it seem more of a possibility."

Interviewed by Sophia Collins



4 Audit of report

TBA



5 Appendices

Appendix 1: Participants

1.1 Schools

Group	School Name	Teacher	Location	5+ GCSE passes *	Classes
GCSE 1	Acklam Grange School	Sarah Gettings	Middlesbrough	35%	1
GCSE 1	Addey & Stanhope School	Kathryn Sullivan	London	37%	2
GCSE 1	Hetton School	Maggie Khan	Sunderland	49%	2
GCSE 1	King Arthur's Community School	Michelle Crooks	Wincanton	45%	1
GCSE 1	Sherwood Hall School & 6th Form	Kirsty Price	Mansfield	28%	1
GCSE 1	Oak Lodge	Mairead Ulamoleka	East Finchley	n/a	1
GCSE 1	Simon Langton Grammar School (boys)	Becky Parker	Canterbury	97%	1
GCSE 1	Smithycroft Secondary School	Linda McCusker	Glasgow	n/a	1
GCSE 1	St Laurence School	Hannah Pritchard	Bradford-on-Avon	69%	8
GCSE 1	Valentines High School	Janine Killough	Essex	65%	1
GCSE 2	Bristol Hospital Education Service	Dave Perriman	Bristol	n/a	1
GCSE 2	Heanor Gate Science College	Sally Ann Fox	Heanor	53%	3
GCSE 2	John of Gaunt	Kelly Hearn	Trowbridge	34%	2
GCSE 2	Mangotsfield School	Peter	Bristol	39%	2

		Adamson			
GCSE 2	Sacred Heart	Pam Large	London	88%	2
GCSE 2	Winterhill School	Danielle Fox	Rotherham	43%	2
GCSE 2	Ysgol Tre-Gib	Liz Howell	Llandeilo	52%	1
6th Form	Bury St Edmunds	Nadine Payne	Bury	54%	1
6th Form	King Henry VIII School	Donna Norman	Coventry	99%	1
6th Form	Longsands College	Chris Millington	Cambridgeshire	54%	1
6th Form	Riverside College Halton	Lynn McCarroll	Cheshire	n/a	1
6th Form	Simon Langton Grammar School (boys)	Becky Parker	Canterbury	97%	1
6th Form	Smithycroft Secondary School	Linda McCusker	Glasgow	n/a	1
6th Form	John Cabot Academy	Jennifer Weston	Bristol	87%	1
6th Form	Woodkirk High Specialist Science	Dan Hannard	Wakefield	52%	1

** % of students getting 5 or more GCSEs at grade C or above. National Average = 46.7%*

1.2 Scientists

Group	Scientist	Status	Based at	Subject
GCSE 1	Jenny Barnes	PhD student	Mullard Space Science Laboratory	Jenny studies climate and is attempting to build a model to successfully predict droughts in East Africa
GCSE 1	Peter Styring	Professor	University of Sheffield	Peter studies the use of polymers to build artificial muscles, he is particularly trying to develop a treatment for rectal incontinence
GCSE 1	Tamsin Langley	PhD student	Neuroimaging Research Group, Institute of Psychiatry, King's College London	Tamsin studies the effects of antidepressant drugs on the brain.
GCSE 1	Sam Mugford	Post-doc	John Innes Institute, Norwich	Sam studies disease-resistant genes in oats.
GCSE 1	Heidi Dvinge	PhD student	Corpus Christie College, Cambridge	Heidi is a bioinformatician studying embryonic stem cells
GCSE 2	Ian Walker	Lecturer	University of Bath	Ian studies the behavioural and psychological causes of road accidents, in order to work out ways to prevent or reduce them
GCSE 2	Nicola Harris	Trainee clinical scientist	King's College Hospital	Nicola is working on developing models to improve MRI imaging of stomach cancer tumours, to ultimately improve treatment targeting
GCSE 2	Vicky Just	Post-doc	University of Bristol	Vicky is a structural biologist, looking at enzymes involved in lung cancer, to contribute to drug discovery
GCSE 2	Maria Tennant	Industrial research scientist	Unilever	Maria develops skin care products
GCSE 2	Chris Rice	PhD	Institute of	Chris studies salmonella at DNA

		student	Food Research, Norwich	level
6th Form	Nick Dickens	Post-doc	Institute of Cancer Research, London	Nick is a genome biologist studying the genetic bases of leukeamia
6th Form	Liv Hibbitt	Post-doc	The Wellcome Trust Centre for Human Genetics, University of Oxford	Liv is developing potential gene therapy treatments for Familial Hypercholesterolaemia
6th Form	Aradhna Tripati	PhD student	University of Cambridge	Aradhna studies the history of Earth's climate by studying geological evidence and fossil records
6th Form	Trevor Cox	Professor	University of Salford	Trevor studies acoustics, particularly, how humans respond to sound, and how to make things sound better, for example, by improving the acoustics of classrooms.
6th Form	Jeanette Milbourn	Pharmaceutical consultant	Bannon Milbourn ltd	Jeanette is a specialist advisor in the government regulation and approval of drugs and medicines. She advises companies who are trying to get drugs approved.

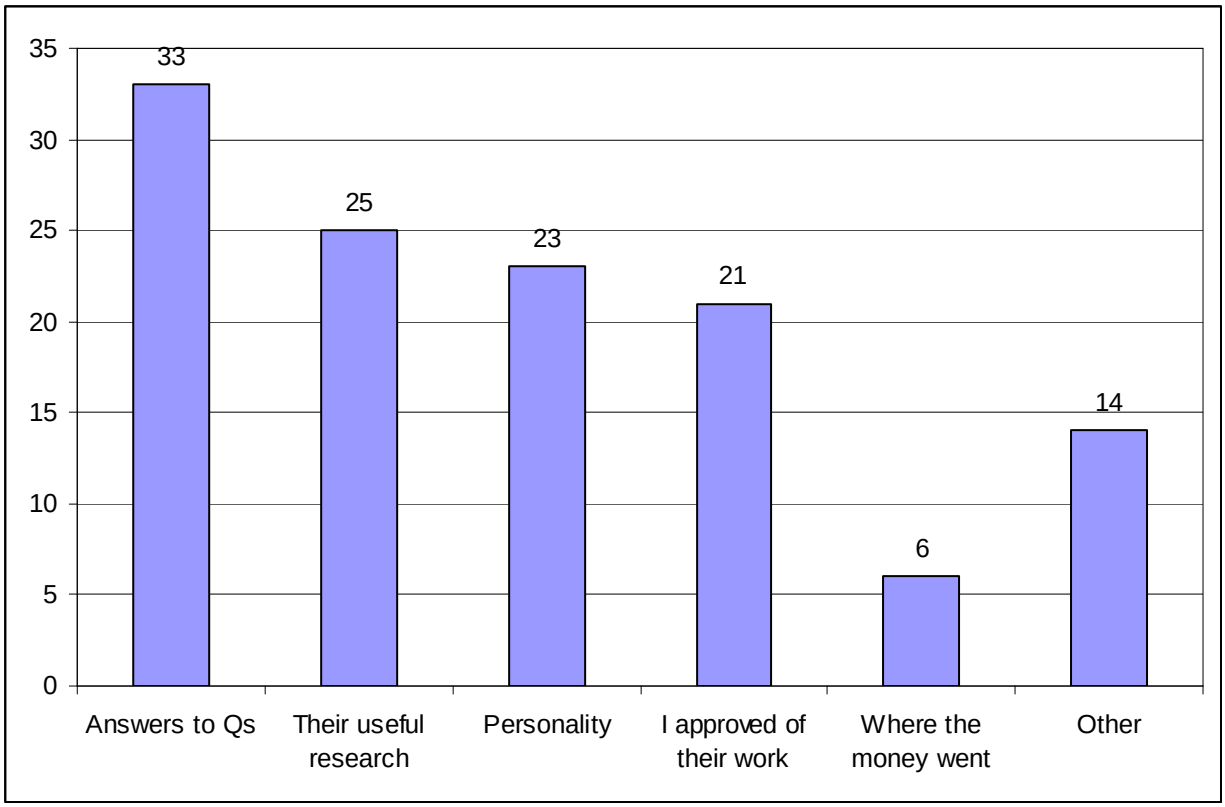
Appendix 2: Summary of feedback survey responses

2.1 Students

Student survey responses based on 141 surveys completed - 63 paper surveys completed in class and posted to us by the teachers and 78 completed online.

Coding of student open-text answers

What influenced your choice of scientist to be kept on the website?



Example responses

Answers to Qs:

- "the way they spoke and answered our Q's"
- "the fact that they have interesting answers to my questions"

Their useful research:

- "what they did - how it could help people"
- "Jenny was the only one whose cause was the best as she was trying to help under developed countries who are in a despairing state"

Personality:

- "the sound very nice and reply quickly and are understanding"
- "How strongly they felt about their own views, wether they gave me responses in which i agreed with and wether they supported my views aswell as their own."

I approved of their work:

- "the subjects they were researching. I found some more interesting than others."
- "i liked the way she was studing animals but she wasn't harming them"

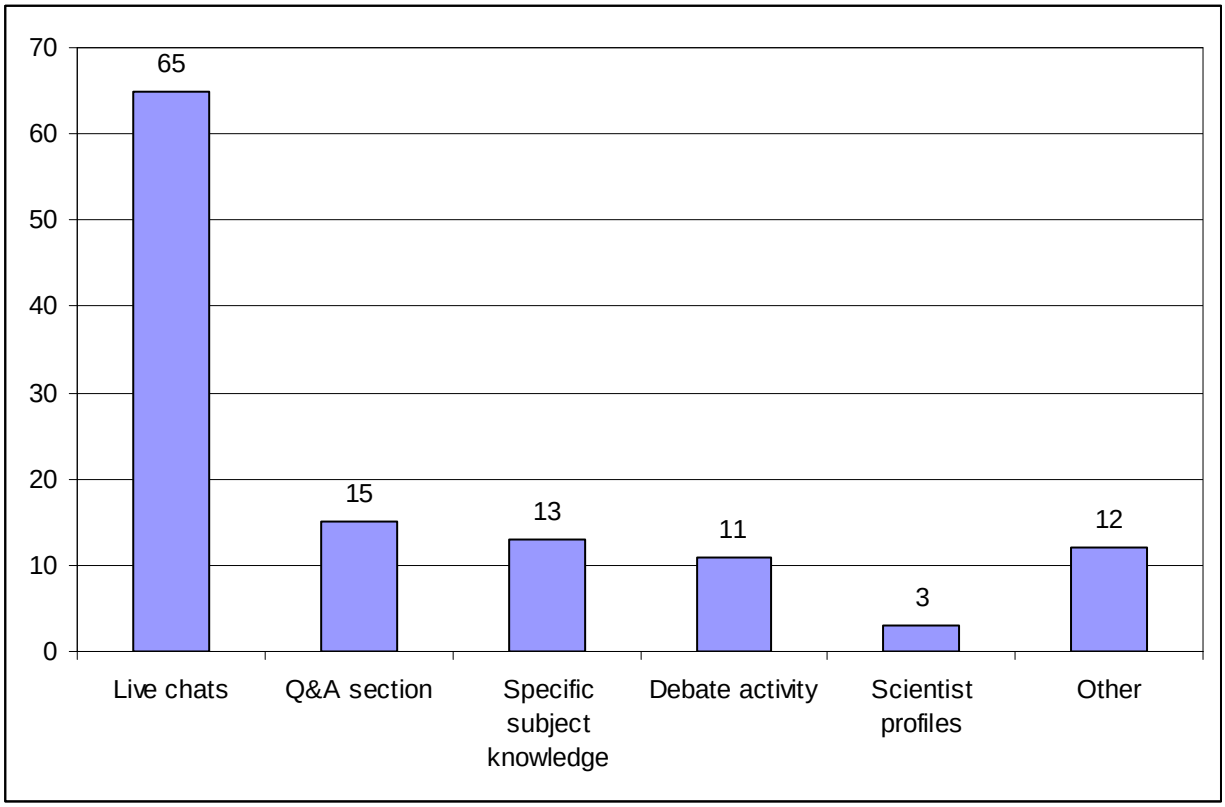
Where the money went:

- "what they spent the £500 on…"

Other:
- "he gave me a wide range of universities and courses to take and told me about them"
- "they actually came on"

98 students responded. 21 students gave two or three answers.

From which activity did you learn the most?



Example responses

Live chats:
- "Live chat"
- "talking to the scientists in the chat room"

Q&A section:
- "asking sciencetists questions"
- "the questions and awnsers"

Specific subject knowledge:
- "i learnt a bit more about the droughts in kenya."
- "artificial muscles"

Debate activity:
- "IVF debate"
- "The one with the cards where we had to make a powerpoint."

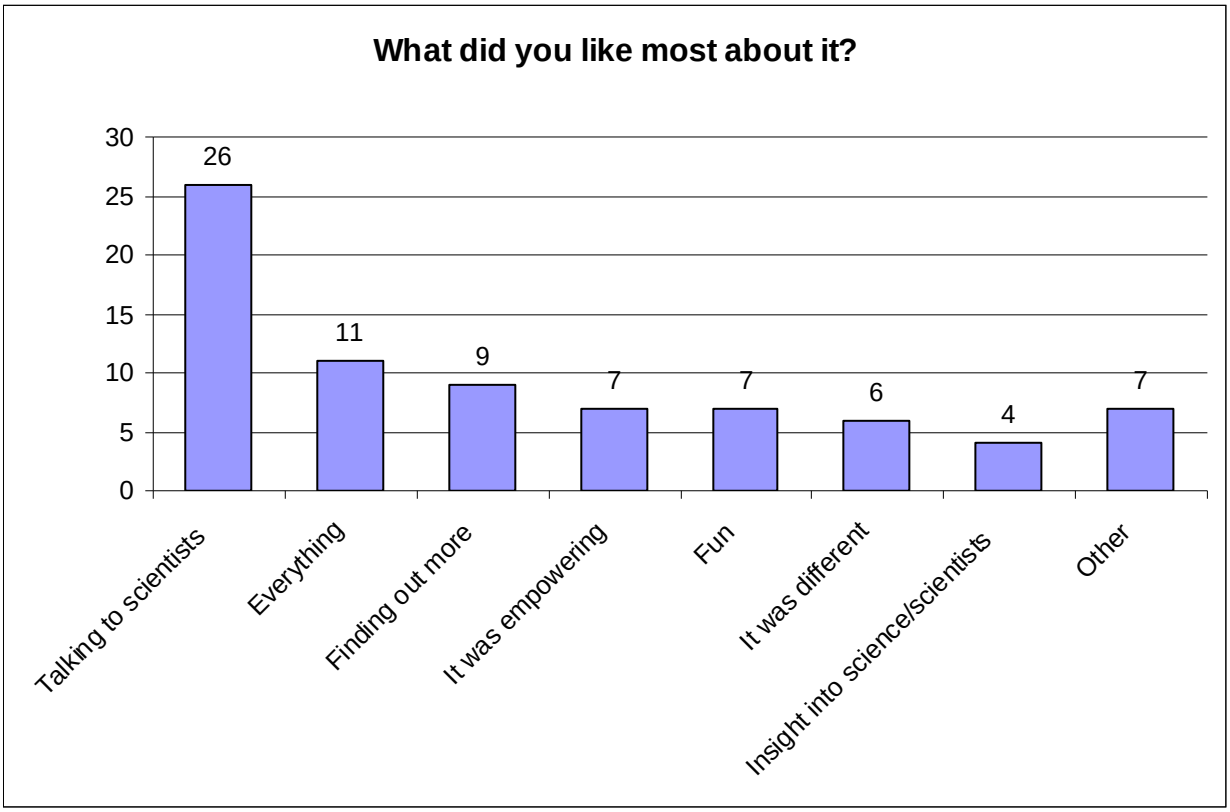
Scientist profiles:
- "reading the scientists blogs"
- "Reading about what the scientists do and finding out the different areas of science that people work in."

Other:
- "i learnt about what they thought i should take for university and i think it really helped me choose"

- "i liked it when i voted because i felt that it was good to give a reason and learn about your answer ! also the exitment of seeing who won the competion!"

113 respondents; 6 gave more than one answer.

What did you like most about it?



Example responses

Talking to scientists:

- "I liked the fact that we were able to talk to real scientists to learn more about certain areas of science."
- "The way that i could chat live to scientists with similar or opposite views and question why their views swung the way they did. I also liked discussing my views to get a response to wether they agreed with me."

Everything:

- "It was easy yet you could do lots of challenging and educational things on it while having fun."
- "everything"

Finding out more:

- "It was interesting to here about real research projects and learn what people are doing in their research."
- "I liked reading about the scientists and different fields in the world of science"

It was empowering:

- "I liked being able to ask questions."
- "being able to be a part of the decision making."

Fun:

- "i liked everything about this website and i would recomend it to a friend who enjoyed doing science this is a fun way to work!"
- "all of it, fun and exciting with our teacher joining in on the live chats."

It was different:

- "We weren't doing class work, and it was more fun than just copying out."
- "Made science lessons more interesting"

Insight into science/scientists:

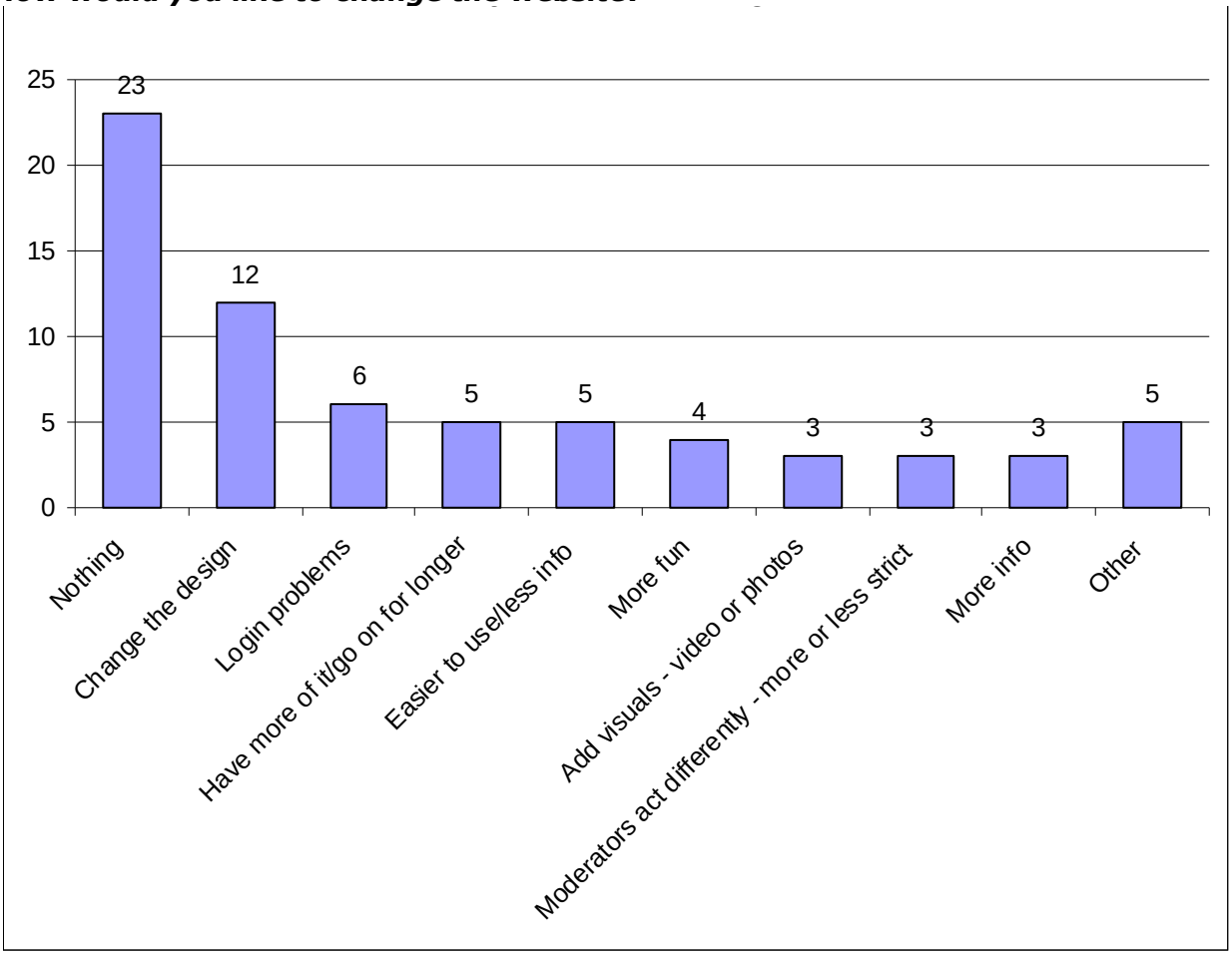
- "it was a good way to show people how scientists arnt like the stereotype"
- "to understand more about scientist's work, and how they solve problems"

Other:

- "How the scientists were in competition with each other and voted off, like in a game-show!"
- "i dont think i liked anything about it because ir wasnt fun and there wasnt anything that you could do that would make it fun"

68 respondents, 9 gave more than one answer.

How would you like to change the website?



Example responses

Nothing:

- "i wouldnt"
- "I wouldnt it is good the way it is now"

Change the design:

- "have your questions bright on your screen."
- "make the chat room more organised"

Login problems:

- "password instead of access code"
- "i would change it so that we could choose our own passwords."

Have more of it/go on for longer:
- "make a live chat all the time"
- "add more things in"

Easier to use/less info:
- "Make the blogs shorter so that they are easy to use and also to explain what each scientist is and what that means they do."
- "make it easy and not have to many pages :)"

More fun:
- "put games on it"
- "Make it more fun.. like mabye games or something on.

Add visuals – video/photos:
- "by putting some videos of what they actually do."
- "More images of the scientists work."

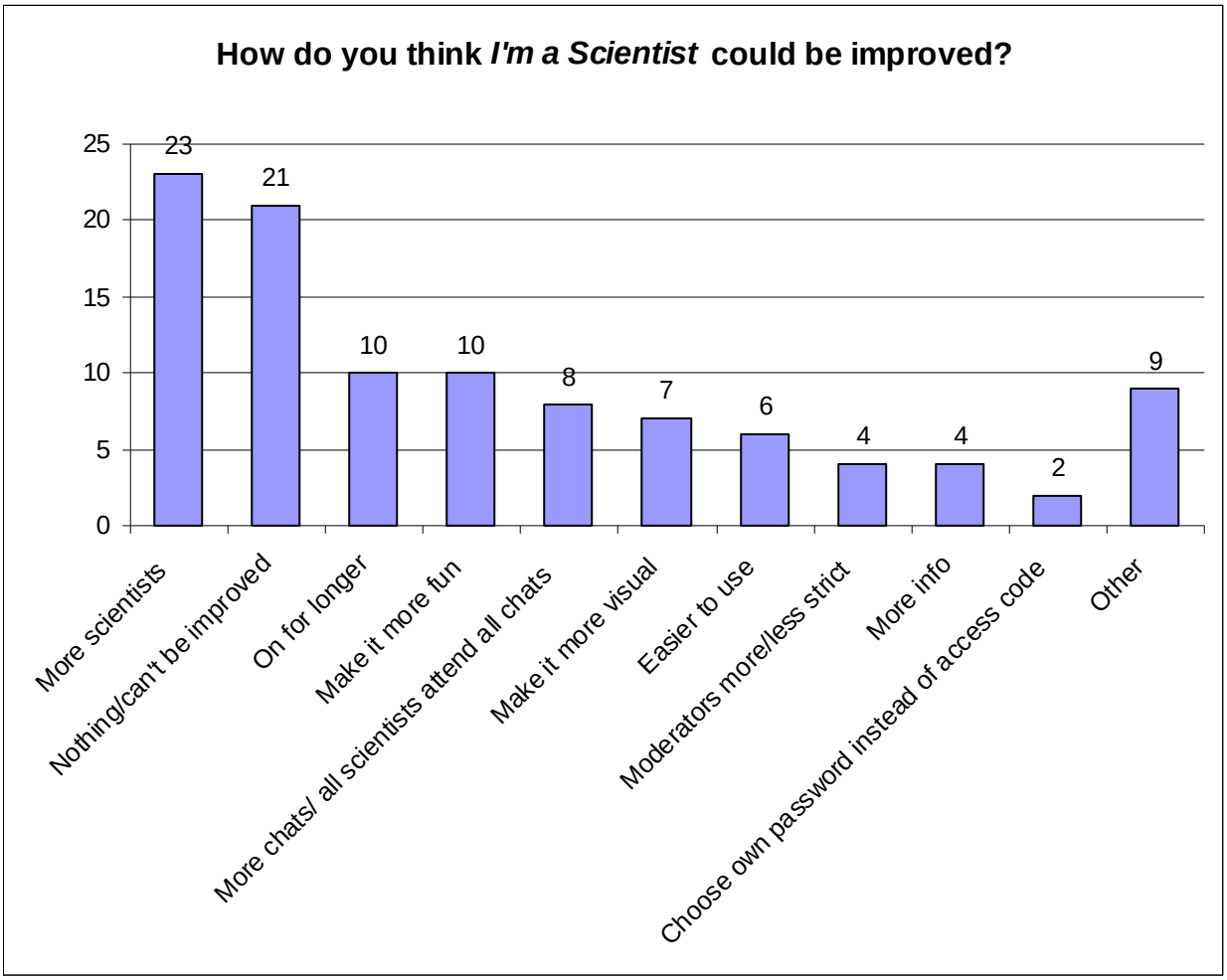
Moderators act differently – more or less strict:
- "moderator more lenient"
- "i would make the moderators more reliable and block the people who were being silly. And Praise people who have made sensible questions."

More info:
- "by put more information about the scientists views and about their actual job, on their page."
- "More explanations"

Other:
- "make it better"
- "i would close it down. a waste of money"

66 respondents, 2 gave more than one answer.

How could the event be improved?



Example responses

More scientists:

- "more scientists in the competition"

Nothing:

- "It doesn't need to be improved"

On for longer:

- "longer time to ask the scientist more questions and to get to know them"
- "it could be a bit longer because it wasn't very long"

Make it more fun:

- "making the website more interesting for younger children"
- "Make it more fun, like games."

Nothing:

- "i wouldnt"
- "I wouldnt it is good the way it is now"

More chats/scientists attend all chats:

- "put the scientists on more regularly"
- "all scientists should turn up for the live chat"

Make it more visual:

- "Maybe if the chats were live webcam chats so you would know that you actully are speaking to the like-minded scientist that you thought you were speaking to."
- "by webcams"

Easier to use:

- "Condensing the profiles for quicker reading."
- "the chat room could have been a bit more organised"

Moderators more/less strict:

- "the people who are being stupid on live chats should be blocked and not just given a warning because then the scientist would be able to answer the questions"
- "erm - moderator less strict"

More info:

- "Send alerts about each eviction because I kept forgeting."
- "by keeping people informed of who has gone by emailing people"

Choose own password instead of access code:

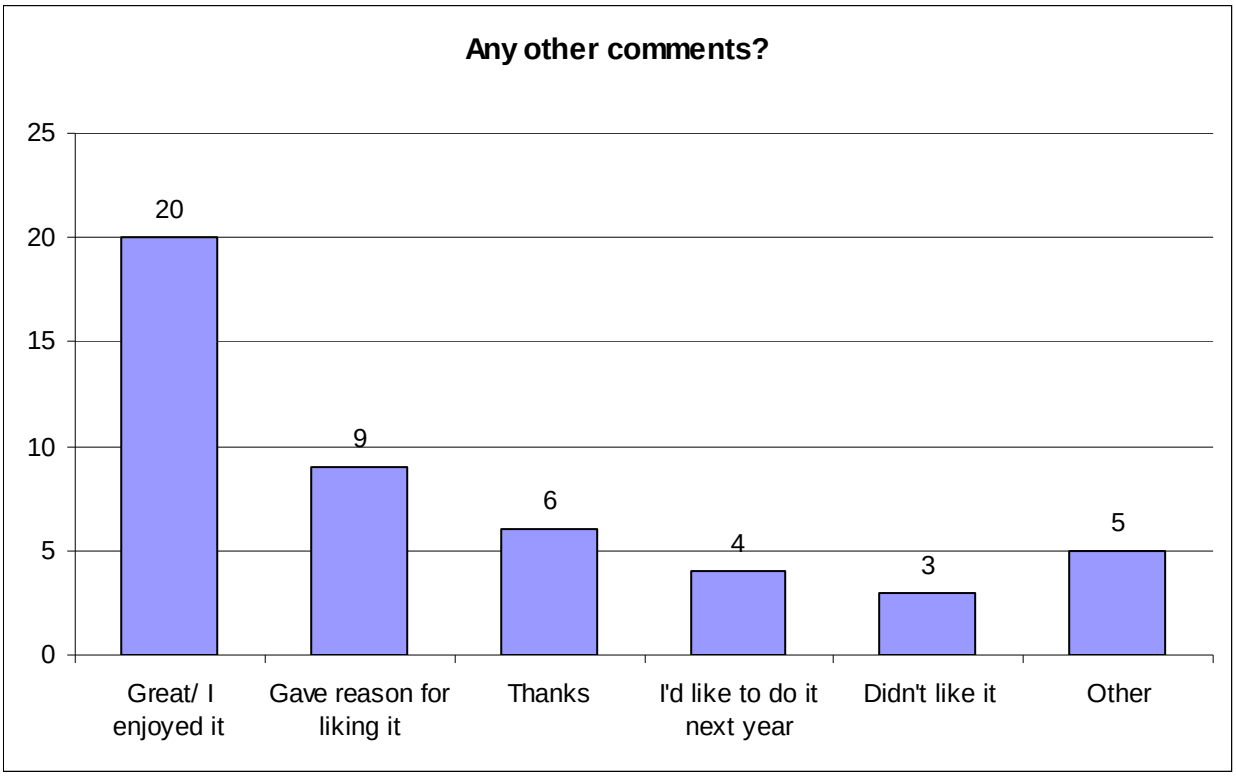
- "instead of an access code, to have passwords because lots of people forget their acces codes"

Other:

- "Dont run it at the end of the year - it would work better i think at the start of the school year because kids are more focused"
- "involve the user more"

97 respondents, 10 gave more than one answer.

Any other comments?



Example responses

Great/I enjoyed it:

- "really great fun"
- "i really enjoyed using this website"

Gave reason for liking it:

- "It has allowed me to see science in a e new light and it's not all diagrams and diaphrams. I even had an arguement with someone in an other set for science that believed that it was a waste of time because we are now behind the other groups but I fought your case and now he wishes he'd had the same oppertunity."
- "…some new info to add to our ever growing brains =]"

Thanks:

- "thank you very much."

I'd like to do it next year:

- "Dont looking forward to next year"
- "i hope that if you do it next year i could get involved"

Didn't like it:

- "i found it deadly boring and a waste of computer memory"

Other:

- "the scientists SEEM like normal peoplebut i cant be quiet sure"
- "There could have been more time between the online votes."

37 respondents, comments from 10 respondents fit into more than one category

Summary of responses to quantitative questions

How interesting did you find the project?
110 of 141 students – 78% - said it was "Very" or "Quite" interesting

Compared to before I'm a Scientist, is your understanding of…

- 122 of 139 students (88%) said they understood "what scientists do" 'better' or 'much better'.
- 80 of 138 students (58%) said they understood "how science works" 'better' or 'much better'.

Now you've played a part in "I'm a Scientist…" how confident do you feel about debating science issues?
69 of 114 students (60%) said they felt more confident or much more confident.

Where did you use the I'm a Scientist website?
At school – 68%
At home – 1%
Both – 30%

Did you like the format of the project?
109 of 119 students, 92% - Yes

Selection of key responses to open-text questions

From which activity did you learn the most?

- Well from all of it really as I learnt loads and feel much more confident to put my hand up and ask questions and know that ok sometimes I will get it wrong

What influenced your choice of scientist to be kept on the website?

- The sound very nice and reply quickly and are understanding
- I liked ian he was cool
- the people that have jobs in saving lives and finding cures and basically hard working
- whether they answered my questions, how vital their work was
- the help they were doing 2 actual people
- what their expirements were and if they were more important than the others
- How it would affect lives and the world we live in
- they gave me a detailed answer
- The friendly ones and ones who answered my questions. Also, those who I thought might be able to do something useful with the money.
- What they did – how it could help people
- how well they answered your online chats, what they were going to do with the prize money, and how willing they were to spend time answering the questions.

What did you like about it?

- It gave you an insight into what being a scientist is really like
- talking to the scientist it was like we were talking to them in really life
- We weren't doing class work, and it was more fun than just copying out.
- I don't think I liked anything about it because ir wasn't fun and there wasnt anything that you could do that would make it fun
- I liked everything about this website and I would recomend it to a friend who enjoyed doing science this is a fun way to work!
- It was easy yet you could do lots of challenging and educational things on it while having fun
- I liked reading about the scientists and different fields in the world of science and I liked being able to ask questions
- how it was totally up to us and not influenced by adults
- Made science lessons more interesting
- I liked the fact that we were able to talk to real scientists to learn more about cwertain areas of science. Also the fact we had control of who we would like to win
- being able to be a part of the decision making and talking to the scientists was fun and interesting. Who knew they were real people with lives and didnt spend the whole day cooped up in a lab! Ha, no of course I never thought that
- all of it, fun and exciting with our teacher joining in on the live chats

How would you like to change the website?

- I honestly wouldnt
- more pictures of the scientists at work, list of schools involved
- have the evictions more spread out so we can talk to the remaining scientists
- by putting some videos of what they actually do
- Maybe easier tab viewing; not so much having to go back and forth. However, it was really nicely designed.
- But if I had a opportunity I would make the moderators more reliable and block the people who were being silly. And Praise people who have made sensible questions.
- Make the blogs shorter so that they are easy to use and also to explain what each scientist is and what they means to do
- make a live chat all the time

How do you feel I'm a Scientist could be improved?

- Longer time to ask the scientist more questions and to get to know them
- More scientists, spread the project over a longercourse of time and to explain in more depth the science of each scientists work
- erm – moderator less strict
- more live chats, every scientist turn up for live chat
- the scientists could answer straight away, they should all be online at the same time
- ermm,, make it more simple to use
- Make it easier for new users and explane things differently
- I don't think it could be improved really you hit the nail on the head
- Condensing the profiles for quicker reading
- tasks for the scientists to do to win votes
- But if I had a opportunity I would make the moderators more reliable and block the people who were being silly. And Praise people who have made sensible questions.
- I don't think it could be, it was so simple and great fun ^^
- instead of an access code, to have passwords because lots of people forgot their access codes

- Maybe if the chats were live wbcam chats so you would know that you actully are speaking to the like-minded scientist that you thought you were speaking to.

Please let us have any other comments

- the scientists SEEM like normal people but I cant be quiet sure
- it has allowed me to see science in a new light and it's not all diagrams and diaphrams. I even had an argument with someone in an other set for science that believed that it was a waste of time because we are now behind the other groups but I fought your case and now he wishes he'd had the same opportunity
- I want to be a scients now
- good all round and good confidence giver to ask anyone anything
- it was good because I learned new things
- I found it deadly boring and a waste of computer memory
- I really enjoyed using this website there should be more for english and maths and subjects!
- Thank you very much to all the scientists, it was a really interesting and fun idea which definitely made me more interested in science
- it was a good site and i'm glad we had the chance to go on it
- thank you very much. By the way I feel it was a good diea to have schools involved so we could do this in class for not many people would be interested to go on this or use the website outside of school. Once again thanks and well done jenny. You deserved it and definitely got my vote!
- Really great fun some new info to add to our ever growing brains =]

2.2 Scientists

Summary of responses to quantitative questions

Which of the following sections of the site did you think was best for communicating with students?
7 of 15 (47%) - Q&A
8 of 15 (53%) - Live chat

Overall, did you enjoy taking part in the event?
13/15 (87%) - Yes, it was fantastic (best response)
2/15 (13%) - Yes, it was OK (second-best response

Would you participate again?
13/15 (87%) - Yes
2/15 (13%) - No

Would you recommend it to a colleague?
15/15 (100%) – Yes

Selection of key responses to open-text questions

What do you think you gained from the experience?

- It was a wonderful opportunity to reach out to hundreds of students without having to leave your desk. I gained more understanding of the interest Y9 students have in climate and it was interesting to see what they thought scientists were like!
- I learnt how to better communicate my ideas to an audience of younger people.
- Improved my communication skills, extended my networks in terms of other academics as well as making contacts in schools (from this event I have organised 2 schools to go and visit), had A LOT of fun, learnt a great deal about subjects that I would never have considered previously through the Q and A, learned to consider topics from an original perspective.
- First of all, my typing speed increased significantly ;) No, mainly I think it was really interesting to hear what questions and concerns the kids had relating to the kind of wok we do. Also, it's useful having to try and explain my research to other people and learn how much or little the average person knows about some biological topics.
- It was heartening to hear from the students that were trying to decide what to pursue scientifically in the future. I also realised just how much energy and curiosity they have!!!
- It was really good to get a different perspective on my work, and to find out what a section of the public think of science. I am a student doing a Diploma in Science Communication and it has really helped me to realise the importance of outreach to encourage young people to at least consider science as a career, whilst making it fun!

What do you think the students gained from the experience?

- Hopefully they gained some understanding of how science is done- that its not about knowing stuff, but about finding stuff out using scientific method.
- Realising that scientists are human! We all have lives and don't look like Tefal Boffins!
- Better ask them... Hopefully they gained some more insight into what science can be about and what it's like to work as a scientist. Interestingly, after a couple of the chats some of the teachers remarked that they had learned quite a lot as well.

Hopefully they'll carry that with them for future science classes in school. As I recall, one of them remarked that it had really got her thinking about the way she teaches science, and what might need to be changed there.
- I hope I have convinced them that science isn't just about learning facts, but that it is fascinating and that there are a real range to careers to consider.

Thinking about your initial expectations before you started the event: have they been met, not met, or exceeded?
- Exceeded! I didn't really have any idea of what to expect from the event... and the whole experience turned out to be fantastic!
- My expectations of the level of interest and engagement by the students was exceeded.
- I really didn't have any expectations. I did come out with some very positive experiences and no negative ones.
- Expectations exceeded, I thought I would enjoy it but I enjoyed it even more.
- I think they have been exceeded- I was a little nervous about taking part beforehand but I really enjoyed it.

How do you think it compared to other forms of science engagement or dialogue you may have been involved with?
- I think this was probably the best science engagement event that I have ever been involved with. I think the on line nature of it meant the students were more comfortable asking questions... when you are talking to a class of students you NEVER get the number of questions or the social interaction that happened in the webchats. The students clearly felt very comfortable using the media and felt that they could ask anything without looking stupid, this lead to some excellent questions and very interesting conversations!!
- More two way than some group activities, it was easier for kids to ask questions from a distance without being shy or inhibited in front of their peers (which sometimes happens in the classroom).
- In terms of the number of children involved it was on a much larger scale than anything I've done before. And despite this I think it enabled a certain amount of one-on-one communication which would be difficult on such a scale in any other type of event. Brilliant.
- I think it engaged the kids in a way I've never seen before
- Wonderful! Despite not being face to face as a scientist I definitely felt I was making a positive difference to the students' lessons and it was surprisingly easy to communicate and get my personality across just from typing. I would say that it was pretty intense with regards to time and I spent a lot of time answering their questions (maybe that was just me?!). Additionally, trying to answer complex questions on the ethics of animal research was very difficult in comparison to talking to the kids face to face. I think that the event would definitely gain from some prior info for the kids on animal research pre talking to the scientists. Overall it was extremely enjoyable and I was completely addicted to it and looked forward to talking with the students and answering their questions everyday; it was a complete pleasure.
- I think it's a really useful form of science engagement, but it will never completely be able to replace actually meeting with students in person and having a real dialogue. The teachers also seemed quite satisfied with the event though, which was nice to hear.
- I enjoyed this a lot because of the live chats with the kids, and because of their level of engagement. I think it was a higher level of engagement than in some forms of outreach because of the format, which empowers the kids.

What was the single most important outcome for you as a scientist?

- I am now excited about my work again!! I also FINALLY managed to explain my work to my Dad in a way that he understood!!!
- To see enthusiasm in all... students and scientists.
- Probably I'm more aware about how some aspects of my research will need to be communicated better to the public. It's quite common to read about for example "genes" or "genomes" in the newspapers or hear it on the news, but I think that to a lot of people it's still not very clear at all what those terms really mean, and what are the implications of the sort of work we do.
- Realising how much more communication needs to occur between scientists in my field and young people. I was shocked by how sceptical they were about climate change being dangerous and human-induced! This makes me want to do more outreach work.

What is the main thing you have learned from taking part?

- I've learned to pitch my work to lay people
- That the pupils are interested in us as people, which I often thought they weren't/
- animal experimentation is more emotive than plant metabolism
- That some of the students are a pretty insightful, thoughtful bunch - and a lot of them really enjoy science!
- That there is an interest in science expressed by school-children but perhaps they are being turned off of science at school due to inadequate and perhaps dated teaching methods.
- Something I already realised but this event has reaffirmed it for me... students are an untapped source of genius; we should pay more attention to their opinions and their reasoning as we could learn a lot from them.

What did you particularly like about the event?

- The webchats were awesome! They were so fast and furious and exciting and the students were such funny and interesting people.....after each one I needed a cup of tea and a sit down because I was exhausted and over-excited, but it was so cool!!
- I like that it gave us a chance to show the kids how scientists are really in many ways quite normal people ;) When you for example go out and give presentations in schools, the questions tend to be more "formal". Whereas here when you're just chatting or in the Q&A, the kids often also asked more personal questions about us.
- Interactive live chats- although they took up much more time than I thought they would. This really helped to put a 'human' face to science. I also liked the fact that there were so many students who were genuinely interested!

Would you change the event in any way? If so, how?

- Have a drop-in/drop-out room open all the time so students could drop in at lunchtimes, etc. We had the drop-in/drop-out chat room for scientists but I felt that it wasn't well used (I only popped in a few times). I think the fact that it was using a custom web technology made a difference - why re-invent the wheel. Using existing chat technologies (MSN, GTalk, etc) would make the whole thing slicker, just make specific lists of users, etc. Although this would make moderation more difficult there are teachers and moderators present at all times anyway. There is skype technology that can be used in a conference-style so you can probably use something like that and boot people off if they aren't behaving.
- The Q&A to have a sense of a thread. I'd like students to be able to comment on the scientists answers to get it more like a web discussion group.
- Chat sessions to have a bit more structure. I don't have any probs with being asked about non-science stuff, but some of the chat contained very little science

qs. Maybe the students need to think in advance of qs they want to ask - some pre-work for teachers.
- It would be good to have a chance to use some more advanced web:
- Each scientist has a video
- Twitter to see what scientists actually do
- Talking to the scientists through VoIP

What would you do differently next time (if anything)?
- More video / photos of scientists doing research. It was a little too anonymous.

Did anything surprise you?
- I was surprised at how much I got into it! Well all of the scientists did! It was more exciting than I thought and the evictions were more scary! We all wanted to win so much ;o)
- The enthusiasm and knowledge of some students.
- HA HA... erm no not really, I work with a lot of secondary school students so not much would surprise me! If anything, I was surprised at the maturity of some of the students and their grasp of scientific concepts and societal issues.

Are there any other comments you'd like to make?
- Am I allowed to participate again?
- I enjoyed doing this - I got the feeling the schools were all private - i may be wrong, but I really would like state schools be involved in this as I feel they are more likely to fail in areas of science. The current 21st century science curriculum is dumbing down science too much.
- It was incredible. The kids really made the event into the success that it was (and of course all the hard work that you did in the office). I got up in the morning excited about talking to the students and to Sophia and Ben! It was absolutely fantastic and took over my life for 2 weeks completely. My boyfriend heard about nothing else and had a full debrief of all live chats and all questions! Many thanks again for allowing me to get involved. Was a great experience and I have very fond memories. I look forward to meeting Sophia and Ben in person. Sorry for any typos in this, was typing pretty fast, am having withdrawal symptoms from the live chats!

2.3 Teachers

Summary of responses to quantitative questions

Useful resources and parts of the site:

- 50% of teachers said "Lesson plan 1 – You're the judges!" was Very Useful
- 55% of teachers said "Lesson plan 2 – IVF debate" was Very Useful
- 45% of teachers said "Lesson plan 4 – Live chat" was Very Useful
- 75% of teachers said that Live Chat was Very Useful
- 59% of teachers said that Q&A were Very Useful

Using the site

The average number of students taken onto the site by each teacher was 29.5

Benefits

- 86% of participating teachers think their students now have a more positive view of science.
- 75% think their students now have a more nuanced view of science.
- 77% think their students feel more able to debate and discuss science issues.
- 68% have seen evidence that their students are more confident in their opinions.

- 78% of teachers said that the event was "Excellent" or "Good" at making life easier for the teacher
- 86% of teachers said the event was "Excellent" or "Good" at inspiring and engaging students.
- 83% said the event was "Excellent" or "Good" at teaching How Science Works
- **100% of teachers said they would participate again.**
- **100% of teachers said they would recommend the event to a colleague.**

Selection of key responses to open-text questions

Thinking about your initial expectations, before you started the event: have they been met, not met, or exceeded?

- They were met. The pupils really enjoyed the event - and even thanked me for arranging for them to take part!
- Lesson Plans – met. Live Chat – exceeded. Lesson resource sheets/IVF cards – exceeded
- The pupils really bought into the whole experience. The project got them talking about and interested indifferent aspects of science that they had not thought, about which was a key aim for this group of pupils.
- I had no real expectations just a hope that students would enjoy learning through a very different media. This was certainly more than met.

What did you gain from the experience?

- I gained confidence in using the chat facility as a learning activity. I had a go at using it with my class before the live chat session and will definitely try it with other groups in the future because there is an interesting change of class dynamics when chatting online. I also found that my students appreciated my efforts in getting them involved with such a project. It was a good sharing the learning experience with them, and them knowing I was not the expert in particular discussions.
- It was a lot of fun, I became more confident with doing online chats, and I learnt a great deal about my students.

- Seeing students enthused by science, actively engaged with the scientists and seeing how they can relate to the science world
- It was really interesting to engage with the scientists and it was great to see the pupils really thinking about the issues rather than just accepting information.
- I very much enjoyed running this and feel I gained a lot out of it. I was able to be a guide rather than a 'teacher' and really had some great chats with the pupils. Some 1-2-1 chats, some small group chats as I went round watching them getting involved in the activities. I was able to listen to their view points without worrying about following a syllabus. I thought this built my relationship with some of the pupils.
- The confidence to tackle more controversial topics in a debating lesson. I would not that opted to do that previously.
- Interesting to speak to scientists from different fields and to see how science is used. Greatly improved the debating skills of the class in question.
- The experience let me teach my students in a different way. The type of teaching was very different to what I am used to as I have to work to a rigid scheme and this has to be delivered in a set time scale so I often feel quite rushed! This experience allowed me to deliver lessons in a more laid-back style as it was so well resourced. The students did not write anything down but were occupied for the whole 50 minute lesson and where genuinely interested in what they were doing. It has shown me that my teaching can be different and more open to discussion and debate because the students responded well to this. My only fear is that the curriculum was not covered but having moved through my teaching I am finding that some topics have be covered and in a huge amount of detail better than I would have managed in a normal lesson!!!

What did your students gain from the experience?

- They enjoyed it, and now appreciate that scientists are actually people. They also felt like they bonded with certain of the scientists, and were very pleased that the scientists responded to them directly and by name during the chats.
- insight into the work of scientists. confidence in their own opinion
- an understanding that science is now not just in the past
- Realised that they are important, that that they can have a future in science and that science relates to real life
- Realised that a Scientist can be young and 'normal'. Introduced some new career ideas.
- They worked really hard during this event, but they didn't seem to think of it as work. They learned a lot - they are a really bright group and they just soaked up the whole experience.
- Some of them really got into it and discovered things about what scientists did that they had no idea about. I thought the live chat was excellent and most of them gained something from this (from learning about different jobs available to thinking about the impact of the job etc). I also thought the activities were brilliant to get them thinking about HSW and they fed this back to me.
- We now have several students who have totally been inspired by the scientists involved!
- improved awareness of scientific funding, issues in research and an understanding of the very different people involved in science research.
- A chance to voice their opinions about science. Some were very intelligent, some needed more information to help them form an opinion and some were quite controversial!

Re: the previous question [Do you think they feel more able to debate and discuss science issues?] can you give an example?

- Debate / discussions aren't something that they have experienced in their previous schools. I have tried a small amount of discussion work with them previous to our participation with the project but don't feel I was very effective at leading the session. Linking the work to the resources provided (IVF cards for example) gave me more of a structure to work with and I think the students engaged with it because it had the project logo and was therefore worthwhile!
- Following the event, we've had a debate on nuclear power, which the students enjoyed a great deal. We're going to debate the purpose of space exploration next week!
- Having their questions answered on line has boosted their confidence. Other teachers have reported hearing the pupils voice their opinions on science issues outside the science room
- most of them are now able to listen to each other (with help) and justify their own ideas
- They are much more willing/quicker to give their views on science issues - we had a chat about cosmetic surgery in class - not a planned debate, it just came up as part of the lesson - and lots of them had well thought out view on the topic. I dont think they would have been so ready to engage in discussion before this event.
- I thought the IVF cards were brilliant for debating. It made the debate run smoothly and showed them clearly how different people have different points of view. By giving more info gradually, the pupils started to think about each situation and change their opinion with justification. I would really like to see some other cards like this on different topics.
- Many of our pupils were totally against all animal testing. through the "you're the judges lesson" were the criteria were selected through a class debate, they accepted that while animal testing is not ideal it is a valuable part of some research. They key point was they made that decision after a reasoned debate, even though it was difficult to change their minds on such a strongly held view.
- Looking at bigger picture - potential benefits to society/individual or even research for the fun of research.
- the IVF debate went on for two lessons and they started defending their viewpoints which they wouldn't have done before. They also began to see all sides of the argument rather than have a blinkered approach
- Now when i am explaining a topic they ask 'Why' a lot more and put their own point across.
- They were still arguing about the IVF debate when they left the room. It lasted an hour. They hadn't done anything like that before but were all on task. They also hadn't really considered anything but their own view point and learnt to ask difficult questions

Do you have any thoughts on what made students engage with the event or not? (eg Did some students engage more than others, did some activities get more engagement than others, did some things particularly put students off, or encourage them?)

- Almost all of the students enjoyed the live chat the most, although one or two were content to mostly watch it unfold before them. Most of the class said that they'd visited the site to vote n their own time, which I was pleasantly surprised about.
- Q&A facility was good, and students felt important because the scientists took time to answer their questions
- Competition aspect - knowing they were in control and they loved the big brother style eviction. Online chat aspect. Scientists who were friendly and quick to respond.

- Students with weak literacy skills found the site difficult to access. There was a lot of text.
- The pupils responded well to the debate, but were really fired up about the on line chat.
- Some students engaged more than others - the class in question is a lower ability and some needed a lot of encouragement to read out the IVF cards. The live chat had them all engaged and the scientists chatting to them about the more mundane parts of life (like their favourite foods) encouraged them to ask more questions. Some of the scientists speak was a bit advanced for some members of the group.
- The interactivity of the website and the fact that "real people!!" answered their questions was great, especially when it happened live
- its was different to their normal lessons so they felt excited and privileged to be taking part.
- ICT - teachers are so far behind the students. The debate element of it.

What was the single most important outcome for you as a teacher?

- To help deliver How Science Works in a different style. It's something that i can feed back to the department in the hope it will modify the teaching of these difficult concepts.
- Students having fun in a science context.
- Enthusiastic pupils arriving to science lessons. The pupils feeling valued by outsiders. (Sorry that's two!)
- Pupils getting a wider idea of what a scientist is
- Enrichment of the curriculum. This group is hungry for knowledge and it can be difficult to enthuse them with the routine curriculum stuff. This was something new and different, both in its content and its mode of delivery (online) and they really got into it.
- The event encouraged discussion about so many different aspects of science. Some of the pupils got quite passionate about their views.
- That the pupils were looking forward to their science lessons, asking about them in the corridor etc.
- students realise that research requires planning and also that it requires scientists to be able to bid for funds if the research is to take place.
- Students thinking they could run a similar event locally with scientists face to face.
- I enjoyed it and learnt more about my students as I was talking "with them" rather than "to them" if that makes sense?
- the fact that discussions can be held without a riot breaking out and that the students have learnt how to debate

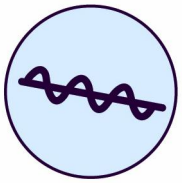
Would you like to expand on your answers to the previous question [How did you feel that the event performed at...] at all?

- Having resources provided, and having students interact with a third party meant I could concentrate on facilitating rather than teaching. No matter what your experience as their teacher, it can never be as interesting as an outsider (even if you have a very similar science background to the very people the students are talking too)
- I had to check through the information to make it more accessible to my pupils. The students needed a lot of adult support to take part. It certainly didn't make my live easier but it was well worth it.
- We were short on time for this event. Consequently we were not able to get as much out of it as we would have liked (our fault not yours) but it was definitely a good thing to do.

- It didn't inspire my students as much as I hoped, partly because they didn't have access to all the scientists.
- In terms of making my life easier, it actually took a fair bit of time to get my head round the resources - not that they weren't well-planned and organised, but to be confident with them, it took a similar amount of planning time as a regular lesson
- The resources are still useful after the event.
- HSW is a tricky thing to teach, I feel you learn How science works as you study science so teaching someone how it works can be difficult. This experience definitely helped with this aspect of the new curriculum though!

What did you particularly like about the event?

- the organisation : resources, website, booking facility (even if this didn't quite work with the scientists)
- The opportunity it gave to hear opinions of some of the quieter members of the group. The chance to take part in something outside of everyday teaching and deal with real life scientists
- I loved the whole concept of the real scientists but I equally loved the resources you provided to back it all up.
- All the lesson plans were there and useful, with supplementary work if needed
- organisation! quality of resources / professionalism. process
- It challenged a number of sixth formers by making them think about the variety of possible career paths which scientists follow. It also made them realise that scientists were a vibrant and fun crowd who they could relate to. Fantastic to have such a bright crowd of interesting people for the students to have a dialogue with.
- I particularly liked the IVF roleplay activity and I think the idea of assigning roles really helps students empathise with the person whose role they took; it really helped them to get the complexity of the debate
- The well developed/researched resources they were excellent!!! The live chats were good fun



Appendix 3: Evaluation findings during project development (ie formative evaluation)

3.1 Lesson observation

This enabled the project team to get a feel for the structure of lessons, types of activity, depth of knowledge and understanding required, likely student behaviour, school environments and equipment, etc. It's difficult to formally record the effect this had on the development of the project, but this 'hands on' understanding was definitely extremely useful.

3.2 Focus group interviews

Teachers

(Please see appendix 5 for the facilitation notes we used to lead teacher focus groups)
Teachers were broadly receptive to the IAS idea – some very excited by it – and impressed by the I'm a Councillor resources we showed them as an example. One of the older teachers was more sceptical, and seemed to have rather jaded view of the new How Science Works (HSW) curriculum. This probably represents a significant strand of feeling in experienced teachers, which needs to be considered when pushing resources for this area.

Timings

- June ideal, especially with Year 9s as exams are out of the way, more free time and often not much to do with them ("You've got them being horrible for a month, they don't want to be there and you've got nothing to do with them.")
- Year 11s could maybe do it in early December and Feb - depends on when module exams are

Target audience

- All very keen on using it for Year 9s after SATs - good intro activity
- Year 10s possible (again, after exams)
- Year 11s, probably too busy to fit it in
- 6th form - less likely to be into the voting, but would appreciate the careers side (ie chance to speak to real scientists about what it's like, how they got where they are).

Teaching resources

- Definitely want them differentiated - different sheets and lesson plans for core/extension/support
- Or all pitched at middle ability with very clear suggestions for how to adapt
- Structure - objective/starter activity/main bit/plenary
- Flag which bits you can skip (so can adapt for time/group needs)
- Make clear what skills/curriculum points covered, helps planning
- Should be easy for teacher to run with straight away - clear, not lots of prep
- The less photocopying needed the better!
- Supply in PPT, PDF, Word (so teacher can customise if necessary) and paper form - so can read easily, write on, etc
- Prefer electronic stuff on a CD - school download speeds can be slow

Topics

- Data reliability is a difficult concept
- What constitutes a fair test? Students use the phrase but don't understand
- Don't have a lesson/sheet explicitly on a curriculum topic (eg Accuracy), have a case study or similar instead - but don't fit too many curriculum points into one activity.
- HSW has a lot of debate/discussion expected, but often students don't really know how to go about it. Activities which help them develop those skills would be good. Needs to be very structured and step-by-step for some - model how to construct an argument and express an opinion.

Other points

- There is a lack of good quality resources in this area
- The new GCSEs were brought out in 2006, the textbooks and other resources to support them feel very 'rushed out'.
- "It's death by worksheet"
- "A lot of the time the new textbooks don't seem to *get* what How Science Works is. They focus on the old 'scientific enquiry' skills bits and miss out the complex, holistic stuff about understanding the nature of science and science and society."
- Practicals are good - GCSE now has fewer but students like them and find them exciting
- Incorporate different learning styles as much as possible - visual/aural/kineasthetic
- Controversy is good - animal testing, nuclear power, global warming, cloning, stem cell research
- Make resources flexible so teachers can pick and choose
- Big difference between KS4 and KS5 is the sixth formers want to be there

Perceived benefits of I'm a Scientist

- Brings science alive
- Relevant to the curriculum
- Work done for you
- Students get to have a say
- Incorporates ICT

Possible challenges

- Fitting it in
- Some teachers think there is too much discussion stuff now and not enough facts, may not be receptive to the idea
- "Some groups you wouldn't want to let loose on the internet in class"

Scientists

Timings

- June, Spring Term or November would be good for academics.
- 1hr/day seemed like a reasonable commitment.

Scientist availability

- Probably find PhD students and Professors would have most time/keenness.
- Post-docs too busy trying to publish.

Information

- They'd want brief (one page) info about the curriculum so they knew what level students were at
- Information about time commitment expected, etc.
- Wouldn't want to wade through lots!

Motivation for taking part

- Would be outreach – giving something back
- Prize money is enough to be significant, but a drop in the ocean research-wise.

IT

- Scientists might want to upload images, possibly video (depending on their area)
- We can assume that scientists are pretty IT literate and savvy. They can work stuff out.

3.3 Educational advisor's input

Ian's contribution is, like the lesson observation, difficult to formally quantify. He gave the insights of an experienced, working teacher and examiner, who also has an MSc in Science Communication. At every stage Ian would give feedback on ideas, plans, what we'd found out, suggest who to contact about things and how to go about things. He could, for example, say straight away what would and wouldn't work in the classroom. His input was absolutely invaluable. Particularly his measured and practical tempering of Sophia's occasionally missionary zeal for the project.

3.4 Testing design with young people

28 young people preferred 'bubbles'
12 preferred 'explosions'

The three most common words chosen to describe 'bubbles' were (in order of preference)

- Fun
- Inspiring
- Unusual

The three most common words chosen to describe 'explosions' were

- Naff
- Boring
- Pointless

We hadn't actually thought 'explosions' was that bad! But we decided not to use it… 'Bubbles' was used with minor changes.

The "If the designs were a student at your school" question didn't work as well as hoped. Most answers were actually to the unasked question: "What do you think of the design?" eg "Nice colours, better design, clear and funner than B." The lesson we drew from this was that it's important to be very clear and firm when briefing your peer evaluators.

3.5 Consulting teacher panel

This was an extremely useful method of formative evaluation which we would definitely recommend to anyone. Teachers gave very practical tips, feedback on what they thought would work well and what wouldn't, suggestions of topics for resources and suggestions of other websites, resources or projects to look at, etc. We were also able to gauge where our explanations weren't clear, and what teachers wanted more info on, by the questions they asked. Lastly, we were able to get quick answers to specific questions from a range of teachers.

We incorporated most of the suggestions made by the teacher panel for changes to the plans for resources and lesson plans. We added activities that were suggested and used

topics suggested by teachers. And we clarified things and re-structured things where teachers felt they weren't clear.

Example 1 – Question categories

We had to decide on the categories for student's questions to the scientists. These help to prompt the students with what to ask, and also help to organise the questions on the site and make things easier to find. They need to be readily understandable, comprehensive, and map onto the major areas teachers need students to think about.

We had a discussion about whether to have categories for "social and ethical implications" (ie both good and bad) and "environmental implications" (ditto), or have categories "possible benefits" and "possible problems" (or possibly challenges). The former would help students to think about how social effects and environmental effects might be different and both needed to be considered. But students might find 'implications' a bit difficult. Also, it might be preferable to make explicit that research might have both good and bad effects and we should consider both.

We were able to send out a list of potential categories, with an explanation of our thinking and ask what teachers thought would be most useful and most understandable to their students. We got back eight responses that afternoon and were able to make a quick decision, knowing that we'd taken on board the views of both pre and post 16 teachers, in different subjects and from very different sorts of schools.

Example 2 – Choosing a video format

Another example shows how well the teacher panel and blog (and other research) worked together. In our scientist research we found that some scientists might want to put up videos, and we thought this would be a good idea. However we knew from visiting schools (and we checked this with Ian, the educational advisor) that while some teachers find video a useful teaching aid, school systems will often block video content, particularly from specific sites, and may not have the capacity to handle certain file formats. Technically, embedding links to YouTube videos would be the simplest solution, but would this be accessible to schools?

We put up a page on the blog with links to test video clips in various formats (eg Quicktime, WMV) and hosting platforms (eg YouTube), along with a simple report form for viewers to say whether they could access the video or not (http://imascientist.org.uk/?page_id=30). We asked consultation panel teachers and other blog readers to test the clips on their school system and tell us if they worked.

From this we found out that YouTube was blocked by about half of school systems, and no platform/format worked for everyone. A blog reader then suggested that she had used Google Video in similar circumstances. We tested that and found it worked for everyone. Unfortunately, for technical reasons we weren't able to use Google (it caused problems with the content management system running the site).

We found that WMV files (hosted on our site) were the next most widely accessible format and used that, although ultimately other technical issues meant that videos were not able to work on the site during the event. However, it had been extremely useful to run such a test with lots of schools and know what would work and what wouldn't, rather than guessing or relying on third party reports.

Further thoughts

A real benefit of this method – which may seem a little esoteric – is that it made the questions we asked teachers very concrete for them. Because the consultation panel teachers were planning to use the event themselves, they were picturing a real situation when thinking about their answers. It's easy in focus groups or surveys to start imagining very hypothetical situations and so give answers which don't entirely reflect what you might really do in a real classroom. Our teachers were picturing themselves, working with their students, which I think improved the quality and reliability of their input.

The consultation also gave teachers some ownership of the event and the resources, which meant they were more committed to using them when the time came.

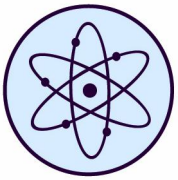
3.6 Project blog

The blog was another excellent development tool. It was very simple to set up and maintain and was an easy way of being very transparent with what we were doing, getting useful input from people, making it easy for people to link to us and comment. Blogs are far more 'alive' than static webpages and help people to get a sense of what you're actually doing and feel involved.

> "I liked the blog because it kept you up to speed before the event. Having a blog make it OK that the event would happen."
>
> *Liz Howell, teacher, Ysgol Tre-Gib*

It also helped give a discipline of thinking, "What have we been up to, what are we doing next?" in order to think of something to put up!

The blog got 1,477 absolutely unique visitors between its inception and the start of the event. Average number of pages visited was 3.54, average time on the site was 3 minutes 40 seconds. The blog has an average of 64 subscribers to the RSS feed and 112 email subscribers.



Appendix 4: Facilitation notes for teacher focus groups

1. What would be the best time to run the pilot event, from a teacher's point of view?
    a. 24th March – 4th April (last two weeks spring term)
    b. 21st April – 2nd May (first two weeks summer term)
    c. 5th – 16th May (third and fourth weeks summer term)
    d. Later in summer term
    e. For two weeks or one?

2. We will run two separate events, with separate teacher resources, etc – one for GCSE, one for AS/A Level. What would you see as the ideal target group for the pilot?
    a. Any/all of Years 10-13
    b. Years 10 and 12 – (ie miss out years 11 and 13 because of proximity of exams)
    c. Also include Year 9s in summer term

3. Teaching resources will consist of 6 lesson plans (and supporting paperwork – eg character cards for role play), five info sheets and quizzes (one quiz to go with each info sheet) for each event. What would be the ideal spread of these for teachers?
    a. All pitched at the middle ability, we can adapt them as needed
    b. Half simple, for younger/less able students, half more challenging for older/more able students
    c. All more challenging – we would mainly use this resource with older/more able students
    d. All simple – we would mainly use this with younger/less able students
    e. Other

4. What aspects of How Science Works and other areas of the curriculum would you most like lesson plans or info sheets on?
    a. Accuracy
    b. Variables
    c. Data reliability
    d. Testing hypotheses
    e. Coming up with alternative explanations of results
    f. Sources of bias
    g. Social influences on science
    h. Case study on wider effects of scientific progress
    i. Other

5. Composition of lesson plans/support materials
    a. Is it most useful to do lesson plans as one coherent plan which should take a lesson, or mix and match shorter activities?
    b. If one (hour long) lesson – should structure be i) short starter activity, ii) main bit, iii) summing up?
    c. Instead of handouts and paper docs - PPT slides and other resources to be used on a computer screen? As well, or instead of?

6. Anything else useful? eg schemes of work?

7. Terminology – what is appropriate instead of council (group? Exam? Level?) and manifesto (scientist pages? Bio? About me? Lab book?)

Appendix 5: Further recommendations for the future

These are the changes or additions we propose to make to the event, in addition to rolling it out.

5.1 Develop more debate cards sets

Of the offline resources that supported the event, teachers were particularly impressed by the IVF debate cards (see 'Debate and Discussion' in section 3.2 for further information). These proved a simple but highly effective way to develop students' critical thinking skills about science, get them seeing different sides to a debate and give them the confidence to discuss the issues.

We would like to develop further sets on different issues within science, such as stem cells, euthanasia, and methods of tackling climate change. These sets could standalone, and used in classes that did not need to be taking part in I'm a Scientist. In fact they could be used in non-science lessons too – for example, Citizenship, RE, English, Geography (for some topics). We will be looking for funding to develop these sets, and to supply them free of charge to more schools. All our resources are licensed under Creative Commons and teachers are free to use and adapt them.

5.2 Add audio-visual content to website

We plan to make a short, five-minute film, which introduces the event, explains the basics of how it works, and hears from some previous participants. This will make the site more accessible for low literacy students, help teachers introduce the event without having to do lots of reading first, and immediately communicate some of the excitement of the event.

We also plan to add the facility for scientists to upload videos themselves. This will be more accessible, help 'bring the scientists to life', and better facilitate learning for more visually oriented students. It should also make the website look more exciting.

5.3 Re-structure site Q+A section

The Q+A section, which shows the scientists' answers to all the questions they are asked, is effectively one long text page. With the huge number of questions we got, this became unwieldy and it was difficult to find things.

We propose to re-structure this page, using more graphics, so that categories are better separated and only the questions are visible, with answers appearing when you click on questions. We'd also like to add the ability for students to comment on scientists' answers – for example, to ask for further clarification.

Appendix 6: Project personnel

6.1 Project Manager/Producer – Sophia Collins

BSc Pharmacology, University of Edinburgh
MSc Science Communication, Imperial College, London
(Funded by ABSW/Wellcome Trust bursary)
CELTA, Cambridge TEFL qualification.

Work in science communication

- TV work. Five years working as a Researcher and then Assistant Producer in science television. Shows included the award-winning first series of "Science Shack" with Adam Hart-Davies, "Body Story" for Channel 4, "Cheating at Athens: Is it worth it?" for Channel 4 and "Tested on Humans" for Sky One. Various non-broadcast projects, eg a DVD for schools about the work of the British National Space Centre.
- Museums. Nine months working for NMSI trading on "Sparking Reaction", their exhibition on electricity generation and the issues surrounding it, for the Sellafield Visitors Centre.
- Writing. Occasional writing work, including for The Lancet and Focus magazine

Work in youth engagement

Worked as Chief Moderator and consultant on I'm a Councillor, Get me out of Here! intermittently over the past three years. This crystallised my feelings about the importance of communication as a two-way process. I saw how effective this simple format could be, and how enthusiastically young people embraced the chance to get their voices heard (and simply to speak to adults who weren't disciplining or denigrating them). It was inspiring. As well as a lot of fun.

Since Jan 2007, working full time at Gallomanor, producing the I'm a Councillor event, assisting on other projects and developing new formats to break down barriers and create community conversations.

6.2 Executive Producer – Shane McCracken

Shane is the Director of Gallomanor Communications Ltd, which he set up in 2001. He's an ex-advertising executive and later television executive, with a degree in business management. Creator of the I'm a Councillor format, as well as LifeSwap (www.norfolklifeswap.org.uk) and the award-winning CampaignCreator (www.campaigncreator.org).

6.3 Technical Director - Michiel Dethmers

Michiel has been the Technical Director for I'm a Councillor since it started. As the technical lead for the content management system, the Webbler, that runs it, Michiel's other credits include websites for the National Theatre, the Institute of Contemporary Arts and the Royal Society.

6.4 External Evaluator – Yvonne Harris

Yvonne is the Director of Yvonne Harris Consulting, a business specialising in developing user research projects focusing on users' experience with interactive media including interactive exhibits, websites, computer games, and touch-screen kiosks. Yvonne Harris has over ten years' experience of audience research and evaluation. She has managed evaluation projects for clients including the Department for Culture Media and Sport, London Zoo, the Science Museum, the British Library, the Creative & Cultural Skills Council, Ecsite-uk and Parliament.

6.5 Educational Consultant – Ian Francis

Ian is a well-respected and experienced educationalist and science communicator. He has taught secondary science and physics across the whole age and ability range for the past 15 years, most recently in Hertfordshire. Aside from his ongoing classroom experience, he has an MSc in Science Communication from Imperial College, is an examiner for Edexcel, and regular contributor and consultant for Planet Science as well as being a member of the Royal Society's partnership grants for schools committee. His publishing credits include the Times Educational Supplement, New Scientist and The Lancet.

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