Final Evaluation Report

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

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"Wow. This is actually quite amazing. I'm actually talking to a scientist"
(Student, June 2011)

Final evaluation report on this Gallomanor project, funded by the Wellcome Trust, WT089852

Gallomanor creating community conversations

I'm a Scientist Get me out of here

wellcome trust

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Executive summary

> *"I kept finding that I'd ask a question, and they'd give me an answer, and then I'd have loads more questions, and then more, and then more!"*
>
> Student, June 2010, West Thames College

In June 2011 over 7,000 secondary school students registered at http://imascientist.org.uk/ to take part in the UK's largest online science engagement project.

They read the profiles of 115 scientists, and asked over 21,000 questions. After duplicates were removed, 8,620 questions were approved and the scientists left over 17,500 answers. In the course of 333 live chats, scientists and students wrote over 100,000 lines of text. June 2011 was the 6th time that the I'm a Scientist event has run.

This report will examine how well the event has worked.

Has it promoted two-way dialogue between students and scientists?

Has it delivered against the objectives and outcomes set out at the beginning of the project?

Has it secured further funding?

The event runs for two weeks at a time and the students ask questions, chat to the scientists and vote for the scientist they want to win. More information on what the event involves and how it works can be found at http://imascientist.org.uk/about.

The overall aim of the project is to **promote two-way dialogue between scientists and secondary school students**. The evidence is clear that this aim has been achieved. One of the advantages of running an online engagement event is that data can be gathered very accurately on a wide range of factors. We know that over 15,000 students registered on the site in 2010/11. We know that in June 2011 80% of them actively participated. That means 8 in 10 either voted, chatted, asked a question or commented on a question. This is not a sample from a self-selecting survey. This is an absolute figure from the records kept by the website (Section 2).

We therefore know that interaction between scientists and students has taken place. But what was the effect of that interaction? For that we do need to turn to post-event surveys (Section 4).

- **96%** of teachers now feel their students have a more positive view of science
- **84%** of teachers now feel their students have a more nuanced view of science
- **79%** of teachers now feel their students are more able to debate scientific issues

- **84%** of students now feel that they know more about what scientists do
- **74%** of students now feel more (or much more) confident in asking questions about science

- **98%** of scientists were positive about their experience of the event
- **65%** of scientists felt they changed the language they used during the event
- **94%** of scientists interacted with other scientists during the event

Section 5 of this report contains Question Keyword reports illustrating the topics asked about in each of the zones from the June 2011 event. Section 3.4 and Appendix 4 give the results of a Personal Meaning Mapping exercise which provide some evidence that the event has changed students attitudes towards science.

The team are confident that the event has promoted two-way dialogue between students and scientists.

At the outset the project team set four objectives:

1. **To run the event consisting of website, competition and supporting materials.**

   This objective was achieved. The new website was built and launched in March 2010 and since then has attracted 220,388 unique visitors who have viewed pages 1,816,729 times.

   55 scientists have won their zone (the Forensic Science Zone in March 2011 was drawn and therefore had two winners) and £27,500 has been distributed to be spent on science communication. More information at: http://imascientist.org.uk/news.

   Supporting materials were produced, sent to participating teachers and made available for download at: http://imascientist.org.uk/teachers/teaching-resources . According to feedback surveys 90% of teachers used at least some of the lesson plans or information sheets.

2. **To run at least 50 zones equating to 250 scientists, 1,000 classes and 20,000 students.**

   In total 54 zones were run in the two years that this report covers. This meant just under 270 scientists took part, as a small number took part more than once. However only 769 classes actively took part in the event resulting in 15,888 students registering on the site (Section 2).

   The team had a target of 400 students per zone which did not seem unreasonable after their experience during the pilot in 2008. However as the event expanded the drop-out rate amongst teachers increased to approximately 33%. To counteract this the team increased the number of classes allocated in each zone to 22. The average number of students per zone rose from 256 in 2010 to 327 in 2011. However it is not possible to lift this average simply by allocating more classes because some zones are over their limit with the current allocations of 22 classes per zone. For example Calcium Zone in June 2011 had 466 students registered. The team need to ensure that the drop-out rate in poorly performing zones is improved rather than increasing the overall numbers across the board.

Being an online event the team are able to analyse which schools turned up in which zones and this work should help them even out the load in future events.

3. To evaluate the project at beginning, middle and end.

The team carried out formative evaluation with teachers at the beginning of the project. A panel of teachers was recruited and asked to advise and that panel has remained in place throughout the project. Teachers and students are also consulted regularly to help guide the choice of themed zones and to select scientists to take part in the event.

Halfway through the event an interim evaluation report was written and published: http://imascientist.org.uk/about/evaluation.

In 2011 each scientist was sent a mini-evaluation of their zone detailing the basic statistics for their zone and information about the questions asked.

This report forms the formal evaluation at the end of the report and the project team are working with the University of the West of England and University College London to create more detailed analysis of the vast amounts of data that the project has created.

4. To secure further funding from other sources to run the project beyond 2011.

The team had targeted themselves to raise a further £77,000 of funding over the 2 years of the project. In the end they managed to raise £15,000 from the Institute of Physics, Research Councils UK and Nelson Thornes Ltd. The feedback from the sponsors has been very positive (Sections 3.1, 3.2, 4.5 and Appendix 6) with the IoP already committed to sponsorship in 2012 and with Nelson Thornes and RCUK in negotiation.

The change in government and abrupt change in government spending did not help the team achieve this objective but there is emerging evidence that more potential sponsors are aware of the event and willing to help fund it in future.

In summary, I'm a Scientist has been a big success. Although it has not achieved the very high numbers of students or additional funders it set out to get, it is clear that it has engaged very successfully with those teachers, students and scientists that have taken part.

> *"I'd just like to say thanks to the Wellcome Trust for the funding, the Gallomanor guys at IAS HQ, and the amazing moderators, and to the lovely students in my zone, and the gorgeous scientists in my zone and other zones too. Everyone was a little puzzle piece in this huge jigsaw of wonderfulness, and although I loved taking part, I'm gutted that it's over, but still ecstatic that I won my zone!"*
>
> Scientist, June 2011

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"I'm a scientist was BRILLIANT!... we talked to REAL scientists, REAL, not fake, totally real!"

Student, June 2011

1.0 Introduction

I'm a Scientist is an award-winning event, funded by the Welcome Trust that as the website (http://imascientist.org.uk) states:

Get(s) your students talking to real scientists online!

It is designed to help teachers deliver the *How Science Works* curriculum and bring real science to life for students. It helps:

- develop discussion and critical thinking skills
- cover key concepts in How Science Works
- get students engaged with science
- provide lesson plans, information sheets, and resources for different ages and ability levels, between years 9 – 13 (see http://imascientist.org.uk)

The first, pilot, I'm a Scientist event was run in 2008, funded by a People Award from the Wellcome Trust and proved to be very successful. The project was then awarded a Society Award in 2009 to run the event at a much bigger scale. Previous evaluation reports are available on the website http://imascientist.org.uk/about/evaluation

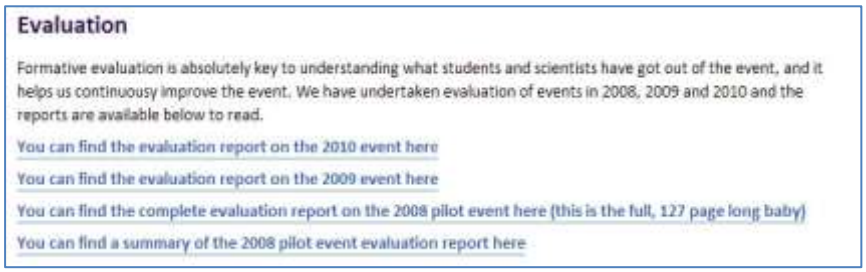


Figure 1. Evaluation reports available to download on the site

One student described it in the school newsletter:

> *I'm a scientist is a website aimed at all teenagers – interested in science or not (but believe me, by the time you finish the project, science will have taken over your brain and made you love it for the rest of your life). Each pupil is given a login, leading to their individual area which can be personalised with pictures of famous scientists, exploding chemicals and swine flu particles. The login works for a specific zone. In each zone, there are five scientists. The aim of the game is simple – you ask questions (on practically anything – from "do aliens exist?" to "have you ever exploded any of your experiments?") and the scientists reply. Then, at the end of the week, you vote for the one you think has answered your questions the best.*
>
> *So whilst I'm a scientist is fun, challenging and educational, it is a door into the future of science, which, with any luck, we will all be able to walk through one day.*
>
> Student, June 2011

1.1 Methodology

Much project evaluation in the sector has inevitably been with small samples and using qualitative analysis to assess, in detail, the impact of programmes on pupils. These reports highlight the rich experiences that such programmes provide (see IAS Evaluation Interim Report, 2010). As of yet data across the sector has not been pulled together to form some overarching conclusions. However, in consistently using similar strategies and frameworks it will be possible to compare data more effectively.

Figure 2. The 2010 evaluation interim report

As a result this evaluation uses a British wide Museum and heritage approach to analyse student outcomes to try to help further evidence for informal learning. The Generic Learning Outcomes (www.inspiringlearningforall.gov.uk) used in 2010 to categorise learning for students look at:

- inspiration and engagement
- knowledge gain
- skills development
- attitudinal changes
- change in behaviour and future intentions

A recent framework for evaluating impact of informal science education in America (The National Science Foundation) suggests a similar range of key factors including knowledge or understanding of STEM concepts, processes or careers, engagement or interest, improved or changed attitude towards STEM related topics, developed skills and a change in behaviour.

Figure 3. Online post event feedback surveys for scientists, students and teachers

A strong element of this evaluation is the quantitative data that has been collected, from feedback from scientists, students and teachers through online surveys but also from data collected through activity online. This data provides key data on engagement and validation of qualitative data.

Qualitative data was collected through case studies with a small number of schools, supported by interviews and short surveys on key areas such as longer term impact. Other tools used also included personal meaning mapping, informal discussions with scientists, and student's work.

1.2 Aims

The project's overall aim (Wellcome Trust bid) states that it will promote *more two-way dialogue between scientists and the public*.

> *"This class have really enjoyed the event and are developing so many skills. They speak about science like a class several years older than they actually are"*
>
> Teacher, June 2011, Unity College Blackpool

Project objectives:

- To run the event (website, competition and supporting materials) as in the pilot (with changes in response to pilot evaluation) over the years 2010-11
- To run at least 50 zones, each zone being one self-contained competition of five scientists talking to 20 classes of students. 50 zones equates to 250 scientists, 1000 classes and 20,000 students
- To evaluate the project at the beginning, middle and the end, to see if the desired outcomes have been achieved
- To secure further funding from other sources to allow IAS to continue

Evaluation questions:

- Does I'm a Scientist meet its remit to inform public engagement?
- Was it *value for money?*
- What worked well and not so well?
- How does I'm a Scientist contribute to the learning within the sector for public engagement with science?
- What is the value to scientists and their organisations?

For more detail on evaluation approach and objectives please see Appendix 1.

2.0 Key figures: 2008 – 2011

2.1 Overall statistics

1. **Objective: 50 zones equates 1000 classes and 20,000 students**
   769 classes actually involved, with 15,888 students. This number was a little low as some classes did not actively take part despite registering. ✗

2. **Objective: To run at least 50 zones, with each zone being one self-contained competition of five scientists talking to 20 classes of students** ✓
   54 zones actually achieved.

3. **Objective: 50 zones equates to 250 scientists** ✓
   270 scientists actually involved.

Further detail below shows the high level of engagement, with over 15,000 students registered on the site for the 2010 and 2011 events. 80% of these (12,710 students) were involved actively, through asking questions, engaging in chat sessions and voting. It appears that themed zones are frequently more active and may well be more easily planned for by teachers.

Site statistics from 2010 and 2011

Factor	2010	2011	Total
Number of teachers	March: 54 June: 172	March: 88 June: 272	**586**
Number of classes	Total: 362	March: 95 June: 312	**769**
Number of students	6397	March: 2304 June: 7187	**15,888**
Number of zones	25	29	**54**
Number of live chats	March: 54 June: 230	March: 126 June: 333	**743**
Difference in number of questions per zone	Sodium: 148 Cancer: 789	Forensic Science: 110 Potassium: 815	Varied hugely from 110 to 815
Number of scientists	125	145	**270**

80% of registered students actively participated in the June 2011 event by asking questions, chatting or voting

The number of live chats varied between zones, from 4 in June 2010 Magnesium zone to 26 in June 2011 Potassium zone.

Statistics from June 2011 also show an enthusiasm for voting for their favourite scientist, with 1167 students voting more than once. They judged on a range of different factors but these often included how much they engaged with students and how their work impacts on society.

4599 students in 2011 voted in at least one round (64% of students)

- 3590 students voted in one round
- 1167 students voted in two rounds
- 296 students voted in three rounds
- 92 students voted in all rounds (1% of all registered students, and 2% of voting students)

2917 students asked at least one question that was approved

- 594 asked two questions
- 480 asked 5 or more questions
- 109 asked 10 or more questions
- One student asked 55 questions (2011)

Clearly the interaction with scientists creates opportunity for individual learning paths and a differing level of engagement according to need an interest. It should also to be noted that students also take interest in fellow student questions and responses.

A focus on one June 2011 zone, the Calcium Zone shows that students develop in-depth conversations with scientists and other students about various topics. In the Calcium Zone (June 2011) there were 383 active participants (82% of students registered). The students asked 2,163 questions, of which 603 were approved to the scientists. The scientists gave 1,734 answers and there were 302 comments left by students and scientists. 321 students voted.

> *"The students are quite honest and when they ask frank questions which is really nice"*
>
> Scientist, June 2011

2.2 Impact on students

The feedback from students shows a consistently high satisfaction level. Of particular significance are the increasing percentage in interest levels and the increased percentage level of developed confidence in debating science.

Responses to student post event surveys

Question	2008 - Pilot	2010	2011 - June
In general terms how interesting did you find the project? (% very and quite interesting)	78%	85%	**89%**
Compared to before I'm a Scientist, is your understanding of what scientists do: much better and better	88%	**91%**	84%
Compared to before I'm a Scientist, is your understanding of How Science Works: much better and better	58%	**77%**	75%
Now you've played a part in 'I'm a Scientist, Get Me Out of Here!', how confident do you feel about debating science issues? (% much more or more confident)	60%	63%	**74%**

2.3 Teacher feedback

Again data shows that since 2008 teacher's perception of quality of the student learning has generally increased with a particularly high level (95%) feeling that pupils now had a more positive view of science. The decrease in percentage level of teachers feeling about increased student confidence might relate to their feeling that students are now more able to understand the complexities of science, i.e. more nuanced understanding 84% in 2011 or an increased focus on other areas. Interestingly student perception of increased confidence has steadily risen.

> *"My students enjoyed finding out about 'real-life' scientists and the type of jobs out there... Their ability to formulate interesting and appropriate questions improved over the sessions"*
>
> Teacher, June 2011

Responses to teacher post event surveys

Question	2008 - Pilot	2010	2011 - June
Do you think your students have a more positive view of science? (% yes)	86%	89%	**96%**
Do you think your students have a more nuanced view of science? (% yes)	75%	76%	**84%**
Do you think [your students] feel more able to debate and discuss science issues as a result of taking part in I'm a Scientist? (%yes)	77%	69%	**79%**
Have you seen any evidence that students are more confident in their opinions? (%yes)	**68%**	53%	54%
Would you participate again? (% yes)	**100%**	92%	**100%**
Would you recommend it to a colleague? (% yes)	**100%**	95%	**100%**
Felt it was good or excellent at inspiring and providing enjoyment	86%	97%	**100%**
IAS helped developed How Science Works	83%	95%	**100%**

3.0 Key findings

3.1 Summative evaluation objectives

Referring back to original objectives we can start to consider success of IAS:

3.11 The extent that I'm a Scientist met its remit to inform public engagement

Feedback from scientists, teachers and students in 2011 confirms strongly that this programme had a big impact on engaging young people (and others) in finding out more about science, the science process and on what it is like to be a scientist. Attitudes towards science and to becoming a scientist have become more positive. The extent of engagement is clearly seen in the web data (see section 2.1) with on average **80%** of students being actively engaged (data from all 23 June 2011 zones).

Teachers in 2011 spent from 1 hour up to 6 lessons working with pupils on IAS, visiting the site up to 6 times.

- **96%** now feel their students have a more positive view of science
- **84%** a more nuanced view of science
- **79%** more able to debate scientific issues
- **54%** feel students more confident to ask scientific questions

Student responses (2011) confirm positive outcomes in public engagement:

- **82%** liked this type of event
- **84%** feel they know more about what scientists do
- **75%** know more about how science works
- **74%** now more (or much more) confident in asking questions about science
- **80%** said they had learnt about science

Stakeholders agree that this form of public engagement is a successful approach:

> *One of our key aims is providing an opportunity for our researchers to undertake public engagement, as well as inspiring young people to follow research careers, study beyond 16 and become more informed citizens*

> *Putting physicists in contact with school students is an important part of the Institute of Physics' work – and online engagement is an important strand to this. IAS has proved to be a very useful vehicle and has allowed our members to get involved without geographical constraints.*

3.12 Value for money

Stakeholders such as the Institute of Physics agree that the programme is successful and value for money. They are keen to continue their involvement;

> *Yes – we are currently looking at our strategy and our future spending. We are interested in doing this again but we need to wait for the strategy review. It is very good value as it is an*

online approach – and thus less expensive – and complements our programme of researchers into school.

Yes, although this might depend on the scale we undertake next year – this initial testing phase for us has gone very well. We can offer this to our network of schools – some of whom do not have specialist physics teachers.

"Value for money" can be defined by the success of the key project aims and objectives and thus will be discussed following a review of these. The overall project *aim* is to promote more two-way dialogue between scientist and the public. This broke down into the following objectives.

To secure further funding from other sources to allow IAS to continue.

This has started to happen, with funding from RCUK, the Institute of Physics, and Nelson Thornes and it is hoped that this model can be developed to create a sustainable project. Not all schools will be able to afford to fund a large fee although colleges of F.E appear to have more flexible funding strategies.

Putting physicists in contact with school students is an important part of the Institute of Physics' work – and online engagement is an important strand to this. IAS has proved to be a very useful vehicle and has allowed our members to get involved without geographical constraints. (2011).

Figure 4. The partners page on the site

To run the event (website, competition and supporting materials) as in the pilot (with changes in response to pilot evaluation) over the years 2010-2011

This was successful:

I found it very surprising because I used to have very stereotypical views on scientists and how they are very boring and are like freaky nerds. But now I have found out that they are not boring and they are very passionate about what they do. They enjoy themselves and have fun as scientists, which makes me even more fonder of doing something which is science related towards the future (Student, 2010).

The NQT has been working with one group and has worked really hard at it. She got an outstanding for her session on IVF from her assessor (Teacher, 2010)

I decided to enter the competition because I was looking for a way to improve my science communication skills and also attempt something completely different. Before the competition, I had no idea whether I was particularly good (or bad) at communicating science to young adults and I thought it would be a good way to find out (Scientist, 2010)

To run at least 50 "zones", each zone being one self-contained competition of five scientists talking to 20 classes of students.

Number of zones that have been run is 54 and thus this objective has been achieved. However, having 400 students per zone has not been achieved, with some schools registering and then not actively engaging. This is being looked at by linking teacher satisfaction, year group etc with activity.

Schools value the IAS programme but under current tight budget conditions not all would be able to afford more than a small payment to be involved. A fee for schools would inevitably mean those pupils that are least likely to access this type of programme will be lost.

3.13 What worked well and not so well?

I'm a Scientist has been a great success and largely worked very well, with improvements being made since 2008 to respond to feedback from all those involved. A small number of improvements have been suggested (see recommendations) and feedback from participants will be needed to continue to remain aware of any issues and to gain more data about longer term impact (see also IAS Evaluation Interim Report, 2010 for detail from specific feedback from case studies at a number of schools).

3.14 The learning for the sector for public engagement with science

Scientists of all ages and experience levels commented on the outcomes for them being:

- Increased enthusiasm for their own science field and in general
- Greater understanding of young people and how to engage and communicate with them
- Increased contact with scientific community

> *"ohhh High praise for this has been mentioned in the room 'this is better than facebook'"*
>
> Teacher, June 2011

I've learned that this is something that I want to do for a very long time. I just need to find a job where I can excite people about science on a daily basis, that pays enough to keep me in pretty shoes! I've also learned that students aren't scary. They are curious, and don't need much encouragement to get really excited and involved in some really profound discussions, for example about science vs. religion

That there are plenty of students who have a real sense of wonderment about the world and their place in it and we should encourage that curiosity and stretching of boundaries

I'm honing my technique for doing science engagement with people who don't even know what linguistics is. As I want to do a lot of this in future, IAS has helped, and I'll build on this experience.

I've learned to be more confident about my answers, and my ability to explain things. I've learnt that maybe school kids find me interesting! I've learnt a lot about what other scientists do, and more about how to communicate to younger learners.

That it's very important not to forget why I'm doing my research and why other people might value it.

3.15 Value to scientists and their organizations

> *"I like the irrelevant questions as they show the students feeling comfortable with us which can't be achieved (most of the time) face to face"*
>
> Scientist, June 2011

Feedback showed the following outcomes for scientists and organizations:

One of our key aims is providing an opportunity for our researchers to undertake public engagement, as well as inspiring young people to follow research careers, study beyond 16 and become more informed citizens

Feedback from teachers suggests it has been very good – although we haven't done any formal evaluation. We have also had some independent A' level students using it – and they have enjoyed it too,

It has fulfilled our aim to engage with society – and this approach means that we reach more remote schools and the programme is nicely student lead. They were interested in science, research, the process etc.

Putting physicists in contact with school students is an important part of the Institute of Physics' work – and online engagement is an important strand to this. IAS has proved to be a very useful vehicle and has allowed our members to get involved without geographical constraints.

Linking scientists to the scheme meets the aims of the Beacon for Wales in terms of getting more people involved in public engagement activities and in terms of being seen as a broker between schemes and Welsh academics.

For the institutions that the scientists belong to, I think that the benefits are quite peripheral as they are limited to a couple of individuals and there has not been the sort of local, or even national, coverage that universities value. The institutional benefits are related to the increased ability of scientists to explain their work, a better understanding of what (and how) young people in schools are taught about science which can help with undergraduate teaching and, possibly, the links that some academics may have made with scientists in other institutions which may have a longer term collaborative benefit.

This scheme contributes to this remit. Whilst we are not expecting all researcher to engage with all sections of society, we are working to get universities as a whole to engage with the full range of publics. IAS fits as one element in the overall work for universities to be doing.

3.2 Evaluation objectives for scientists: summary (see report sections 4.1 and 4.4 for more details)

3.21 The extent of change for scientists from IAS e.g. new skills

Feedback from scientists to the 2011 survey shows that:

- 85 % said it was fantastic and 13% good – totalling 98% happy with the experience!

They found the chat sessions and the Ask Q&A the most useful aspects.

- 50% of scientists spent 2-3 hours a day on IAS

Figure 5. Online post event scientist feedback survey

Their learning outcomes encompassed communication skills, reflective opportunity, discussions with scientists from other fields and increased enthusiasm:

> *That there are plenty of students who have a real sense of wonderment about the world and their place in it and we should encourage that curiosity and stretching of boundaries*
>
> *I'm honing my technique for doing science engagement with people who don't even know what linguistics is. As I want to do a lot of this in future, IAS has helped, and I'll build on this experience.*
>
> *I've learned to be more confident about my answers, and my ability to explain things. I've learnt that maybe school kids find me interesting! I've learnt a lot about what other scientists do, and more about how to communicate to younger learners.*
>
> *That it's very important not to forget why I'm doing my research and why other people might value it.*

> *"I thoroughly enjoyed the experience. I thought some of the questions were very intelligent and insightful and I wouldn't have ever thought to ask them myself! I really enjoyed chatting with the students. The whole experience exceeded my expectations"*
>
> Scientist, June 2011

They also found it useful to engage with other scientists:

> *REALLY useful. It was great to chat to the other scientists in my zone in the live chats - it maybe would have been even better to be able to do this before the event starts, to get to know each other. Also the inter-zone camaraderie on twitter was BRILL. Scientists from other zones were really up for commenting on questions we in the brain zone were struggling with, and the 3pm eviction twitter chatter was great fun!*

3.22 How successful was the recruitment of scientists, and were there barriers to recruitment?

Scientists heard of the programme from a wide range of sources including:

- Word of mouth

- Twitter
- Research Councils and scientific organizations such as the Institute of Physics and the Beacons.

Figure 6. The @imascientist twitter account

Scientists were from a wide range of organizations, educational and business research centres. No barriers have come to light.

3.23 Identify the most appropriate ways to attract scientists

These are:

- Word of mouth eg from others in the institution recommending it
- Twitter/blogs etc
- Through Research Councils and specialist societies advertising
- Growing profile of IAS within the scientific community

3.24 Were scientists expectations met?

Most scientists had their expectations met or exceeded as illustrated by these quotes:

> *I was worried that I would be disappointed, because previous Scientists had been gushing about it, which made me worry that I had overhyped it in my head, but I honestly loved every second! If I wasn't in a live chat, I was on my phone checking for new questions, or working out an answer that I wasn't sure about, or asking one of my friends that would be more likely to know. It was so exciting to receive new questions, because it wasn't just an exercise in teaching. I have learned an awful lot in the process too, and with a curious mind like mine, it has been the perfect thing! Two weeks of brilliant distraction, but I'm really struggling without it now. I'm going to have to get back to my thesis now!*

Some scientists do still find the number of questions overwhelming and so there is still a need to make this clear in introductory literature. It might also be helpful to develop other strategies to support scientists who feel they are receiving too many questions.

> *Well, it was quite a bit more hectic than I anticipated and I ended up devoting much more time to it than I thought I would. Mainly as I felt a responsibility to answer as well as I could the online questions! Even though it was quite a lot of work, I would have liked it to continue for another week - it felt we were just getting in to the throes of it.*
>
> *The time commitment was heavier than expected. Then again, it's down to individuals to decide how much time they want to invest in it. I felt under pressure to answer all of my Qs because the other scientists were doing the same... and my competitiveness kicked in! At the same time, I think the more time you put in to it, the more you get out of it.*

3.25 Did the impact depend on the type of scientist?

There is no evidence that the type of science studied impacts on the student experience or scientist standing in the competition. Enthusiasm and a willingness to spend time engaging with the young

people are central to relationships forming. Understanding student knowledge, areas of interest is also important.

3.26 Are scientists now more likely to do public activity again?

In 2011 scientists said in the online survey:

- 89% would participate again
- 95% would recommend it to a colleague

3.3 Evaluation objectives for teachers: summary (see report sections 4.1, 4.2 and 4.3 for more detail)

Students had a platform to ask questions that were personal to their lives about diseases they or relatives had had. Also found that the personal questions they asked the scientists had a place, (such as "are you all friends/do you know each other") as it helped the students build a picture of the lives of the scientists as well as the actual science they were conducting. This personal connection made it all a very human experience for the school students.

Figure 7. Online post event teacher feedback survey

3.31 How have pupils changed eg in terms of attitudes, empowerment?

Key success factors for students as reported by teachers were:

Communication skills and improved scientific literacy.

The opportunity to see how real scientists are not just men with crazy white hair and glasses but people from all different backgrounds and ages with a common interest.

***Enthusiasm and a feeling of importance**.*

*Inspiration, excitement about science, **confidence in talking about scientific things** and much more!!*

*Getting **career advice and degree course advice** from someone who has chosen to do the sports science,*

***Wider experience/understanding of the subject of "science**" in general and raised aspirations,*

*They also developed **questioning skills** during the live chat (not all of them granted!).*

***Motivation**, an idea of how science can lead to different careers,*
An understanding that scientists don't all work in labs and wear white coats.

3.32 Is I'm a Scientist valued by teachers?

Online survey results for 2011 show that:

- **100%** of teachers would participate again
- **100%** would recommend it to a colleague
- **80%** found it easy or quite easy to use straight away
- **96%** now feel their students have a more positive view of science
- **84%** a more nuanced view of science
- **79%** more able to debate scientific issues
- **54%** feel students more confident to ask scientific questions
- **63%** found teacher notes very useful and another **35%** quite useful.

Teachers also commented in free text that IAS was an excellent **free** activity for students, and most schools would be unlikely to pay for it.

3.33 Have teachers changed their practice?

Feedback showed the teachers had benefitted through:

Experience with IT and confidence in using external sources,

Reading about what scientists are doing currently in several areas - keeping up to date with how things are advancing, which is important for my subject knowledge,

It was great fun and showed me a different side of a number of my children. Very interesting,

Skills in managing debate.

> *"Yr 7 particularly loved the live chats and they were engaged and excited by the whole thing. Yr 9 really got into the debate and mainly loved the 1st chat and having the power to vote"*
>
> Teacher, June 2011

3.34 Were teachers supported enough?

In 2011 feedback, 63% found the briefing notes very useful and 35% quite useful.

Free text in the 2011 survey suggested that teachers were satisfied with the support:

The 'ready made' scenario was easy to use and did not need much development,

I thought it gave a good overview of the process and good guidance. The lesson ideas were good too,

The quality of the resources produced,

Materials provided by you for lesson planning was very good - easy to adapt for younger children

The lesson plans provided are excellent and inspirational for further lesson,

I like the fact there is so much information to read about the scientists and that it is not "stuffy" at all.

3.35 Were debate kits useful?

Open question feedback in 2011 showed these were useful and provided exciting opportunities for students:

> *I would like some varied ideas for the debate, not just IVF again. Maybe a selection that link to the zones,*
>
> *I have used the debate kit (from last year) and it was impressive how some of the quieter students really came into their own. Those that never bother writing things down were also very involved. Many were brave enough to change their opinions when they heard more ideas,*
>
> *I used the materials for the IVF debate and that worked very well with lots of animated discussions.*

3.36 Were expectations met?

All teachers (2011) said that their expectations were met or exceeded:

> *Took part last year and all expectations met again this year,*
>
> *Exceeded. I was particularly impressed with the ease of setting up the live chat. This went really smoothly and the students REALLY enjoyed the experience,*
>
> *Exceeded. The girls really enjoyed the event and some asked more probing and insightful questions that I'd anticipated,*
>
> *I had little initial expectations. I just thought that it would be worth trying this with my students. The students really enjoyed the one chat session that they had and by the end of this time most were quite enthusiastic about actually talking to a "real" scientist,*
>
> *After taking part in all three events this has been the best one - especially as it has lasted that extra week longer,*
>
> *Exceeded - I work with year 5 and 6 children - I was hoping children would be excited/inspired by the chance to interact with real scientists and would see them as being just like themselves.*

3.4 Evaluation objectives for students: summary (see report section 4.1 for more detail)

3.41 Have attitudes to science changed?

- **84%** of students responding in 2011 feel they know more about what scientists do and **75%** know more about How Science Works.

Figure 8. Online post event student feedback survey

- **80%** said they had learnt about science

Attitudes to science have changed:

> *Talking to real scientists was much more interesting than learning the factual information about them. I also liked the chats because it was quite personal and made me realise that scientists are not just the people in books, they are real normal people working every day,*
>
> *I surprised me that all the scientists were just nice, normal people,*
>
> *The scientists seem like normal, everyday people. They inspired me to become a scientist myself.*

Mind maps through student personal profiles online

Students were encouraged to respond to a key question about their attitude to science on their own personal I'm a Scientist profile – 'How does Science make you feel? Please list all the words you can think of…'. Students added words right at the beginning, but then changed and added to these throughout the fortnight.

These changes illustrate the changes in knowledge and attitudes within the students taking part. Without the opportunity to talk to students about their choices, as one would in a deeper mind mapping exercise there is an element of judgement by the evaluator.

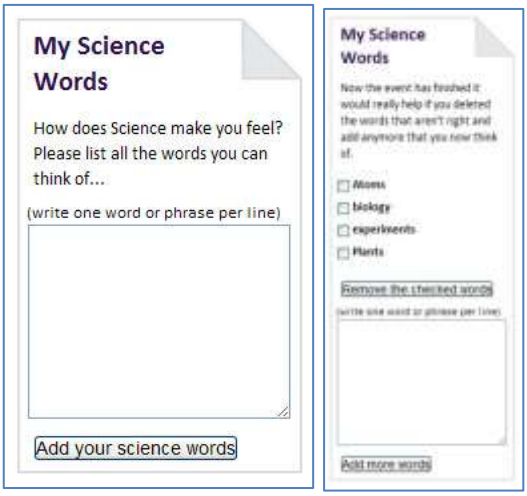


Figure 9. The 'My Science Words' section on a student's profile

Most of the words were scientific words which throughout the fortnight developed widely from largely simple words such as chemistry, plants, acid and photosynthesis to those more related to the zones they had been in and questions they raised. The range of words was not only greatly wider but also richer and included semiotics, zootaxy, sedimentology and acarology with associated definitions! For details of the most commonly used words see Appendix 4 (the data totals 3792 different words and phrases!)

A smaller number of words related to attitudes to science and these encompassed both positive and negative attitudes towards science both at the beginning and end, but with an overwhelming increase in positive words being used suggesting a change in attitudes for many. Some took away their initial positive words but this may of course be due to a more nuanced understanding of being a scientist – eg sometimes hard work, dangerous etc or to wanting to add some more specific details about the topics they had discovered (the data here does not tell us which).

Table 4. Change of attitudinal words from Personal Meaning Mapping

Meaning Mapping	Positive words	Negative words
Added words	509	138
Words taken away	178	89
Net difference	Increase: 331 words	Increase: 49 words

Case study – Personal Meaning Mapping paper exercise with Matthew Arnold School, Surrey

Having finished their 2 weeks of IAS the students, one enthusiastic top set in year 8 and a second set class in year 9, overwhelmingly made the following positive comments about their experience on a mind map:

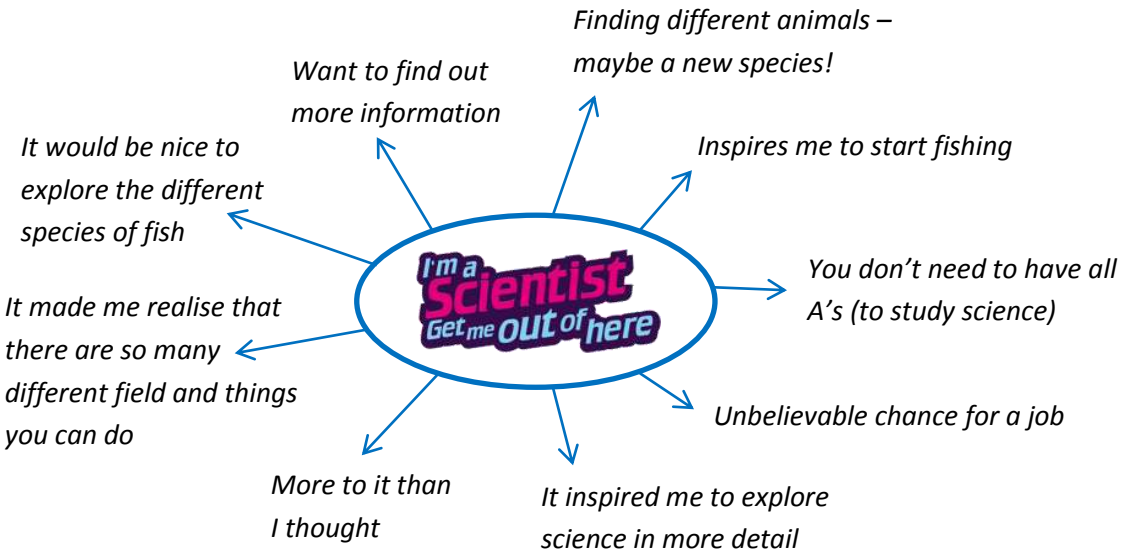
A number of key statements highlighted that some had developed a more informed idea of science:

Learn about nature – what animals eat

The sea is a lot more complicated than I thought

Interesting to find out new things

72% were positive about scientists and science whilst the others had mixed feelings (understanding that only some elements were fun and others hard work!) and some recognised that there are a wide range of careers opportunities in science:



Eight students (15%) though still remained **negative about science**:

It has not inspired me to become a scientist as they earn nothing!

Hard work

Need to be brainy – too hard

Hard work – a lot of studying – challenging – boring – too hard

Their follow up homework which was a review of IAS with discussion of what scientists do through a typical day shows an enormous enthusiasm with much time spent in presenting well designed work in the form of a newspaper article. The homework showed that most students were able to outline how to become a scientist, and a day in the life of a marine scientist with some accompanying interesting facts about marine science. Some students also reviewed the IAS event and clearly enjoyed the process.

> ***So what's my conclusion on the "I'm a Scientist, Get Me Out of Here!"***
>
> *It offers so much – an insight into the lives of scientists, new bonds between scientists and students, and knowledge – everybody can learn something new! It's a great competition for everyone to take part in and offers great opportunities for asking real people real questions to get real answers – it's much more rewarding than simply searching on the internet. One thing I'll take away is that not every scientist does the same job and that you don't necessarily need to need to choose science as your first career to succeed!*
>
> Student, Year 8, Matthew Arnold School

3.42 Have students been empowered to make decisions relating to science?

- 74% of students are now more (or much more) confident in asking questions about science (2011).

They are now more empowered to make decisions relating to science;

> *Getting to chat to scientists and ask them any questions I wanted,*
>
> *It's only been a short time and I've learned a lot about healthy ageing!*

3.43 Are they more confident to ask questions and contribute to discussions?

Students are more confident to ask questions and contribute:

> *The informality of I'm a Scientist was also good, as I felt comfortable asking any questions I was curious about….*
>
> *The fact that they were actually interested in what we had to say and really spent time answering our questions.*

3.44 What do they feel is the biggest impact of I'm a Scientist?

This is a difficult question to answer using quantitative data alone, but reflection using all the data suggests that the biggest impact for students is their increased enthusiasm for science and the resulting confidence this gives them to engage with it.

> *"The pupils were so excited by today! It gave me one of those 'moments' that teaching is all about"*
>
> Teacher, June 2011

> *I don't really do well in science but you inspire me and it makes me want to do science more*
>
> *So whilst I'm a scientist is fun, challenging and educational, it is a door into the future of science, which, with any luck, we will all be able to walk through one day*
>
> *I loved asking real scientists about their research and the way they went about things - it made me feel more comfortable about talking to them with confidence!*

Students in feedback from the online survey in 2011 confirmed that:

- **82%** liked this type of event
- **93%** said the website was easy to use
- **84%** feel they know more about what scientists do and **75%** know more about how science works. **74%** now more (or much more) confident in asking questions about science
- **89%** found it quite or very interesting
- **80%** said they had learnt about science (11% no, 9% not sure)
- **45%** used IAS at home and at school, 2% just using it at home
- **62%** liked the chat experience the most.

3.45 Have they been inspired by the scientists?

Students of all abilities were inspired by the scientists. They realised that scientists are just normal people, and that science is something they, as students but also as citizens, can take an interest in and make decisions about.

I dont realy do well in science but you enspier me and it makes me want to do science more hopfully you will get back to me could you give me some advise how to do more well in science plz

The scientists seem like normal, everyday people. They inspired me to become a scientist myself

Thanks to all of the for asking my questions Im really inspired by learning more science… I hope in the future I can learn a lot like all of you.. thanks ryan and luke

It inspired me to explore science in more detail

3.46 Have some types of classes benefited more than others?

There is little evidence to support this idea, but qualitative data and observations do suggest that different pupils benefit in different ways. Those with less interest and ability may have their attitudes changed and surprise themselves by enjoying it while those already interested in science often realise that there is a wider range of jobs available and that not everyone needs As and A*s.

3.5 Summary of feedback from teachers involved in more than one IAS event

Those teachers who have been involved for a number of years give us a deeper picture of impact and success of IAS.

"This has been a great day and the kids have been really buzzing about it"

Teacher, June 2011

All those who replied to the emailed survey felt that IAS was of great benefit for pupils (see report section 4.2) and they felt that their pupils developed in terms of:

- Enthusiasm, inspiration and excitement developing motivation and confidence
- Improved understanding about science and how real scientists undertake it
- Development of skills including communication and improved scientific literacy, asking questions and thinking more widely about science
- An independent learning experience that engaged all pupils irrespective of ability and background
- Career advice and raised aspirations

The pupils have definitely developed in confidence and with their communication skills. The pupils at our school struggle with communicating with adults and professionals and would never have thought that they could have spoken to a scientist or they perceived scientists to have the familiar stereotype of being "geeky", but this perception has definitely changed,

IAS helps to motivate the students. Particularly those students who have been on a applied pathway and are perhaps not as able, they valued the experience and used it to complete assessed work towards their GCSE.

83% of teachers found that they have developed their own practice.

In terms of improved results they report a mixture of feelings with many feeling that it was too soon or that they did not have the appropriate data to find out about impact but others suggest that :

> *interest has definitely increased, but not to sure about the exam results, I think for this you would have to look at the bigger picture and not just be reliant on IAS, although IAS has definitely given the pupils the skills to help them on their way,*
>
> *Yes – a much bigger cohort have taken up A' Level,*
>
> *We have seen an uptake of numbers of pupils picking triple science - however I don't feel this is purely down to IAS*

> *"For half an hour the scientists were interrogated by extremely energized students, each one trying to out-do the others in terms of the complexity of their questions"*
>
> Teacher, June 2011

In turning to their use of other activities to support science teaching they report using a wide range of activities. Many schools use free events and activities, but some do splash out on one or two activities. However, with budgets getting tighter teachers did not expect that they will be able to continue with paying for more than a very few things:

> *If we paid for this we would not be able to pay for other experiences and would have to choose,*
>
> *Our school has a large number of free school meals and the science department in particular is quite poorly funded, but I think IAS being free is a brilliant scheme for our pupils and pupils from other areas similar to ours in which their background may be quite deprived as they would never get the chance to speak to professionals otherwise,*
>
> *I'm afraid they probably wouldn't, it has been made clear that money is tight. I could bid for a donation from the school parent & teacher fun,*

On a more positive note, teachers from colleges do have larger budgets and are keen to be involved. Though some teachers did state they would like a bit more for their money!

> *It would be nice to have an extra week or so to ask questions.*

Increasing enthusiasm for science earlier in primary schools might well have a greater impact on choices for GCSEs and warrants longer assessment. A primary school teacher that responded to the emailed survey (who worked with Gifted and Talented students) made suggestions on how it might work effectively with a wider mix of pupils.

3.6 Recommendations

Continue to review and develop IAS:

- Longer term involvement for pupils after the event, perhaps through participation of activities developed by scientists from their prize money
- Consider a better time slot for colleges and a separate event for primary students

- Improve viewing of questions and answers in the chat sessions, to show answers next to questions instead of in separate boxes
- Consider management of questions for scientists with perhaps a "get out clause" where questions can be passed on to more appropriate scientists when time limited
- Encouraging preparation of questions etc for schools so that they make full use of the chat experience
- Encourage scientists to add videos of themselves working to their profiles so students can see what they do
- Provide opportunity for several chats for each class
- Continue to market to wider range of schools eg areas of the country not catered for, in particular remote areas with less access to other opportunities

> *"i dont wana log off ☹ ☹"*
>
> Student, June 2011

Continue fund raising from science Research Councils, institutes, learned societies etc

Remain free for most schools

Provide pointers to help scientists spend prize money effectively and provide training for those scientists who would be interested

Continue to collect data on longer term impact upon students

3.7 Concluding thoughts

A report into the study of UK secondary school pupils' perceptions of science and engineering indicates that the general trend in students not taking sciences (http://shura.shu.ac.uk/956/1/fulltext.pdf), especially maths, physics and chemistry, needs to be altered to make sure there is a strong future in science and its support in developing society. It suggests that it is "*clear that students need greater input from careers professionals that focuses on specific information about science and engineering careers …. and the range of careers within*" these fields. Feedback from teaching staff shows that IAS has contributed to an increase in uptake of science.

Value for money can also be determined by the overall numbers of those involved and the quality of the experience:

- The large number of students engaged by the experience
- Time engaged in activity
- Evidence of increased motivation and enthusiasm for science from both students and teachers
- Increased understanding of science, the scientific process and being a scientist
- Increased understanding of careers in science
- Enthusiasm from almost all scientists involved
- High profile of IAS amongst the science community for its new approach to engaging the public in science.

- Increasing commitment from science societies and Research Councils to be involved

In recent years professionals have undertaken evaluation and research to discover the effectiveness of informal approaches in science teaching, not only to support the development of knowledge and skills but also for motivational and attitudinal change. The National Research Council (2009, in Friedman) states that:

> *Experiences in informal settings can significantly improve science learning outcomes for individuals from groups which are historically underrepresented in science, such as women and minorities.*

Of equal importance is the impact on expectations. Tai (Science, 2006) states that:

> *Young adolescents' expectations that they would have a career in science were an excellent predictor of graduating college with a science or engineering degree. The study showed that 8th graders with expectation for a science related career were 3.4 times more likely to earn degrees than students without such expectations even when their ability was greater.*

The use of informal science education resources comes second only to taking a college level course in impacting on improved science literacy (Miller, 2002) and Nature (2010) also states that much of what people know about science is learned informally. Strategies that improved science test scores in 8th graders also include students working together on a science activity or project (Braun et al., 2009). The National Audit Office in Britain also recognises that:

> *Three interventions were associated with statistically significant increases in numbers of pupils achieving grades A*-C in GCSE sciences* (Educating the next generation of scientists).

Other research in the field therefore validates the findings in this report; that I'm a Scientist is a very successful project.

4.0 Findings for 2011

4.1 Feedback from online surveys

4.11 Teacher feedback

- **100%** would participate again
- **100%** would recommend it to a colleague
- **80%** found it easy or quite easy to use straight away (and **16%** finding it easy once they got used to it)
- Teachers spent from 1 hour up to 6 lessons working with pupils on IAS, visiting the site up to 6 times
- **96%** now feel their students have a more positive view of science
- **84%** a more nuanced view of science
- **79%** more able to debate scientific issues
- **54%** feel students more confident to ask scientific questions
- **63%** found teacher notes very useful and another **35%** quite useful .

Open questions: summary of key trends

What do you feel the students got out of doing *I'm a Scientist*?
Key success factors for students Teachers felt that central for student outcomes were: • **Enthusiasm, inspiration and excitement developing motivation and confidence** • **Improved understanding about science and how real scientists undertake it** • **Development of skills including communication and improved scientific literacy, asking questions and thinking more widely about science** • **An independent learning experience that engaged all pupils irrespective of ability and background** • **Career advice and raised aspirations** *Communication skills and improved scientific literacy. The opportunity to see how real scientists are not just men with crazy white hair and glasses but people from all different backgrounds and ages with a common interest.* *Enthusiasm and a feeling of importance.* *Inspiration, excitement about science, confidence in talking about scientific things and much more!!* *getting career advice and degree course advice from someone who has chosen to do the sports science.* *Most engaged fully with the project.* *Wider experience/understanding of the subject of "science" in general and raised aspirations. They also were asked to make group presentations so gained team working and presentational skills* *They realised that scientific jobs are in every part of industry and society. They also developed*

questioning skills during the live chat (not all of them granted!).

Motivation.

Enjoyment in trying something new, and thinking of challenging questions for the scientist.

The concept was AWESOME. All kids were keen to get involved.

It was communication in a form that they are used to.

Students had a greater awareness of the attributes a scientist needs and many researched and found many jobs they didn't even know existed!!

It made my students feel valued and involved in something worthwhile.

Did the package fulfil your aims?

63% found teacher notes very useful and another 35% quite useful.

Exceeded - I work with year 5 and 6 children - I was hoping children would be excited/inspired by the chance to interact with real scientists and would see them as being just like themselves. My concern was that they would be overawed by the opportunity. Oh my goodness, the children were keen to participate and engaged from the first session and were completely blown away by the live chat. A definite success and hopefully a few scientists for the future.

I didn't anticipate how absorbed the students would be, or how much they would enjoy the programme. Very worthwhile!

Met and exceeded. I didn't expect the chat rooms to be so popular with the pupils, it has been a real boost to their enjoyment and engagement with science.

Were there any issues?/Improvements

One or two teachers had issues, often with IT!

Disappointed that we couldn't have 2 live chats and the one we had was on the Thursday of the 2nd week, otherwise it was fab.

Partially met, some It issues on your part and organisation on ours did hinder the learning of some

I think I would have gained more had the event been at a more convenient time - It ran over our report week AND planning week so we had no APT.

Improvements

The certificates for students could not all be printed off from my log in.

When the site was slow this greatly disrupted the event.
Also students could access other schools Live Chats just by logging on.

The live chats finished too early for us to get a slot with my after school club

Quite difficult if live chats had less than 3 scientists. A student suggested having different conversations with different scientists in separate boxes (msn-style) to make it easier to follow

Teachers packs -it would be nice to have a varied selection of debate cards

I know it would be a burden on the scientists, but 2 live chats would further engage the students

Video clip of the scientists at work would be a good aspect to add (a bit of a big ask I know

It would be useful for me as the teacher (and possibly for the students too) if a log of the live chat was available to view after our allotted time. Because it was so fast and frantic, we all missed questions that were being asked by other people and pretty much all the scientists' responses. This would help to help good use & misuse of the live chat. Alternatively, could the questions asked by each student be automatically added to their list of 'questions asked' and the responses added too.

Did you get anything out of doing the sessions – e.g. with regard your own teaching approach or professional practice?

Teachers felt that outcomes for them included learning more about their students, developing skills with IT, developing new ideas for lessons and finding out more about current science work for their own knowledge base.

Insight into my students views about science

Experience with IT and confidence in using external sources

Interesting lessons with minimum preparation time

Reading about what scientists are doing currently in several areas - keeping up to date with how things are advancing, which is important for my subject knowledge

It broadens my appreciation for where science can go-this will help enrich future lessons

A real buzz from the engagement of the students

It was great fun and showed me a different side of a number of my children. Very interesting.

How easy it is to use different media in lessons

Skills in managing debate.

Other approaches to enthusing pupils

Able to see normally disinterested students engaged in lessons

Good resources for future debates

The help needed to get my students looking at the great wealth of jobs available to scientists

An insight into the knowledge students already have

More chance to engage the students in HSW

Lots of opportunities to discuss real issues

Ideas for teaching in the future

4.12 Student feedback from online survey

Generally the data from the online survey (242 responses) shows a change in their interest in science.

- **82%** liked this type of event
- **93%** said the website was easy to use
- **84%** feel they know more about what scientists do and **75%** know more about how science works.
- **74%** now more (or much more) confident in asking questions about science
- **89%** found it quite or very interesting
- **80%** said they had learnt about science (**11% no, 9% not sure**)
- **45%** used IAS at home and at school, 2% using it only at home
- **76%** would recommend it to a friend
- **62%** liked the chat experience the most
- **60%** didn't know the library existed

A small number of students recorded IT problems of one sort or another or found that there was a slow response to answering their questions because of the sheer number of questions asked by students.

When asked about improving IAS most pupils couldn't think of anything – some asked for more chats and others improved logistics/IT.

Attitudes to science have changed with comments such as:

> *Learning about thing that I didn't already know!*
>
> *Talking to real scientists was much more interesting than learning the factual information about them. I also liked the chats because it was quite personal and made me realise that scientists are not just the people in books, they are real normal people working every day.*
>
> *The fact that scientists actually had competitions like this and it wasn't just boring lab coats and test tubes*
>
> *I expected it to be boring, but actually it was quite fun*
>
> *It surprised me that all the scientists were just nice, normal people.*

They were inspired by scientists:

> *The scientists seem like normal, everyday people. They inspired me to become a scientist myself*

Students also felt empowerment to make decisions relating to science:

> *Getting to chat to scientists and ask them any questions I wanted*
>
> *It's only been a short time and I've learned a lot about healthy ageing!*

More confident to ask questions and contribute:

Getting to chat to scientists and ask them any questions I wanted,

The (for pupils to have the) opportunity to ask real scientists questions, and get answers from them.
The informality of I'm a Scientist was also good, as I felt comfortable asking any questions I was curious about. I also enjoyed creating my own profile, choosing my own avatar and being able to write about my own scientific experiences, and general feelings.

The fact that they were actually interested in what we had to say and really spent time answering our questions.

4.13 Feedback from Scientists – online survey summary

How did you find the experience of being part of *I'm a Scientist*? Did it meet your expectations?
85% of scientists said it was fantastic and 13% good – totalling 98% happy with the experience Scientists found the chat sessions and the Ask Q&A the most useful aspects. 50% of scientists spent 2-3 hours a day on IAS
Were there any issues?
Just over half found the guidance notes very useful with just under half (43%) found them quite useful 21% found using the site quite difficult to start with but easy once they got used to it. Most (76%) others had no problem. 3% found it hard through out **Most scientists had their expectations met or exceeded** : *I was worried that I would be disappointed, because previous Scientists had been gushing about it, which made me worry that I had overhyped it in my head, but I honestly loved every second! If I wasn't in a live chat, I was on my phone checking for new questions, or working out an answer that I wasn't sure about, or asking one of my friends that would be more likely to know. It was so exciting to receive new questions, because it wasn't just an exercise in teaching. I have learned an awful lot in the process too, and with a curious mind like mine, it has been the perfect thing! Two weeks of brilliant distraction, but I'm really struggling without it now. I'm going to have to get back to my thesis now!* *I plan to visit two of the schools I chatted with often, so will be keen to see how they went about things their end, and offer recommendations based on our experiences in the chat room. Certainly, in most cases, by the final Thurs/Fri the students I spoke to were more prepared for the process* **Only 3 said they were not met (5%):** *My expectations were not met. I took part in the March event and had a great time but there were so many problems with the June event: such as several answers just disappearing after much time was spent painstaking writing them, failed chats, several schools simply not turning up to chats, and inappropriate comments from certain students* Other issues highlighted include the often mentioned time needed to answer all the questions and for teachers to plan for chat sessions:

I appreciate the teachers have a lot on, and I'm not sure how the arrangements work at the school end. But I understand there is a recommended teaching plan that covers a session in which prior to the competition the teachers would discuss with their pupils how people are going to vote, and to look at scientist's profiles picking out features they want to ask about (and to lead a classroom discussion on that topic); there was little evidence that this had taken place in some cases.

What did you get out of doing IAS

Scientists highlighted as outcomes for them their enjoyment of engaging and communicating with young people, developing communication skills for working with the public and developing confidence to undertake such work.

I've learned that this is something that I want to do for a very long time. I just need to find a job where I can excite people about science on a daily basis that pays enough to keep me in pretty shoes! I've also learned that students aren't scary. They are curious, and don't need much encouragement to get really excited and involved in some really profound discussions, for example about science vs. religion

That there are plenty of students who have a real sense of wonderment about the world and their place in it and we should encourage that curiosity and stretching of boundaries

I'm honing my technique for doing science engagement with people who don't even know what linguistics is. As I want to do a lot of this in future, IAS has helped, and I'll build on this experience.

I've learned to be more confident about my answers, and my ability to explain things. I've learnt that maybe school kids find me interesting! I've learnt a lot about what other scientists do, and more about how to communicate to younger learners.

That it's very important not to forget why I'm doing my research and why other people might value it.

I also gained a lot from the interaction with the other scientists, as a way to reflect on our work and get in touch with other disciplines.

Realisation that students know an awful lot, and really think about some amazing things about life, the world, and the universe
Gained a better awareness of the fact that even though students varied slightly in age, it made a huge difference in how you interact with them, and how to keep them engaged

I've become more excited about my work, which is perfect as I'm now writing up my PhD thesis, and have been reminded of the excitement and potential impact factor of my work, which should get me though these last few tough months!

So much! I was able to rethink the work I'm doing, explaining it to others really makes it clear in your own head. Also some probing questions from kids led me to question some of my ideas about it. Also learnt SO much about other areas of science by trying to discover the answers to questions I didn't know. Kept my busy but enthralled throughout the 2 weeks

Were the briefing notes appropriate?

Most found the briefing notes fine:

I think they were clear enough. Whilst there are things you certainly learn as you start engaging, to try and include everything beforehand would just create too large a document for already busy people to read ;-)

That being said, commenting on other scientist's answers in other zones should be encouraged more, as should less close-ended answers, i.e. recommend to scientists that they fire a question back, or phrase the question in such a manner as to invite dialogue with the student asking.

Was definitely useful having the staffroom practice session with the live webchats the week before IAS started, and Twitter was a godsend in communicating technical difficulties during a couple of webchats.

Did you engage with other scientists?

66% did change their use of language during the event – illustrating development of communication skills with this particular audience group

57% preferred themed zones

66% interacted with other scientists a little, whilst 31% did quite a lot.

The interaction that I had with the other scientists was VERY positive. In fact, I think this was the best thing that I got out of the event. (See my reply to Q3).

Not all the others (scientists*) made use of the staffroom for pre- and post-chat sessions. There was also no way to send another scientist a direct message or get their attention. Maybe having a "private" in team chat area would be good. It would allow us to correct each other in private*

Comparison with other Public engagement how do you feel IAS succeeds?

This questions provided a wide range of largely positive feedback:

I have done a lot of science engagement and it is a lot easier to get kids excited when you can show them props and experiments. Just talking over the internet is extremely difficult.

I think it compares very well. It has a completely different audience and scope to the school interaction that I normally do. I think it is useful, in that it reaches out to those students who are not already interested in the field. I think that is probably one of its greater strengths.

It is totally different, but wonderful. We can engage with students from different areas in the country, different age groups, different backgrounds, and varying levels of interest in science. I think that the method of communication allowed us to chat briefly in the live chats, but also let us go into longer answers on the website. The comments are good, because if I answered a question, I would try and ask whether it made sense, or answered their question, and if they said that they wanted to know more, we were able to do that.

This is by far a superior form of science engagement. But I hasten to add that the word 'engagement' has been carefully chosen. I think this is a wonderful way to get students interested in science and has proven to be very effective in doing just that, but it has its limitations in terms of actually teaching them any science..

IAS filled a gap between scientist and "the public" which no other form of communication had been

able to do before. It put scientist in the front line of general interest questions

I've helped out at science festivals and spoken at schools before. I feel like I was able to engage the students on a deeper level through IAS though - maybe because I was able to build up a rapport with them over the two weeks (which is impossible from a one-off school visit). Having said that, I still value face to face contact and would especially love to visit my IAS schools!

I think it's a very good form of engagement for this particular age group. I think it would be even better if it were able to reach more students at the sixth form/college level who are starting to consider university choices

4.2 Survey from teachers involved in more than one IAS event.

Feedback was sought from those teachers who had been involved in a number of IAS events to ascertain their feelings about impact and sustainability. Twenty three teachers replied (18% of those surveyed). See Appendix 2 for full data.

4.21 How valuable has IAS been in your science teaching in terms of linking informal learning approaches to the National Curriculum, GCSE course work?

100% of teachers found it very helpful and quoted links to the real situation, course work and talking to scientists:

> *I have found IAS immensely valuable*
>
> *I have found it extremely helpful in linking science to real situations and also for the students to talk to scientists- which is a fantastic opportunity for them!*
>
> *I teach BTEC first and extended nationals. The main focus of this type of qualification is to link science to the real world. So this is IDEAL!!!*
>
> *Integral part of the units taught (Stem cells was increasingly relevant to our unit of Genetics & genetic engineering within the BTEC Extended Diploma Applied Science).*

4.22 How valuable has IAS been in your science teaching in terms of developing skills and best practice for you and your colleagues?

83% of teachers found IAS had helped them develop their practice:

> *In terms of my own development it has enhanced my use of ICT in lessons,*
>
> *Completing debates or even inspired lessons from angles that we had not thought of with out the debate cards,*
>
> *For myself, it improved my ICT skills and also gave me the chance to teach less teacher led lessons and hand over more to the pupils,*
>
> *I use it to enhance my current teaching, I don't use the leveled sheets, but I do use the debate kits, I would like more resources based around the zone topics..I would be keen to get more involved in planning, ideas etc too,*

Discussion regarding effective delivery with the sharing of best practice.

4.23 How valuable has IAS been in your science teaching in terms of the development of your pupils?

100% of teachers who responded commented on the huge impact on students:

Developing their interest and realising how science is used,

Opened many students eyes to the world of academia,

Debating, talking to scientists, engaging with science,

It development of their scientific thinking and how broad scientific careers can be beyond doctor, dentist, chemist etc,

(It) helped develop their confidence and curiosity,

Follow their own areas of interest and go 'off piste' from the NC,

In a girls' school, it is important to have strong female role models connected with science, and to promote science as a career choice for girls, and IAS has provided these,

It has engaged the pupils and lessons after they keep asking are we doing I'm a scientist again. It has shown pupils that not all scientists wear white coats and become teachers,

It has been a good activity to develop students use of technology within Science.

4.24 Have you noticed any greater interest or achievement in science as a result of IAS?

Teachers found this question less straight forward to answer, but most felt it had had some sort of longer term impact, often linked to inspiration, confidence and developed communication skills:

The pupils have definitely developed in confidence and with their communication skills. The pupils at our school struggle with communicating with adults and professionals and would never have thought that they could have spoken to a scientist or they perceived scientists to have the familiar stereotype of being "geeky", but this perception has definitely changed,

There is no evidence that results have been impacted as a result. However, students are asking more in depth questions and some have said that they are considering science related careers as a result.

Our science results have increased recently but I am more inclined to attribute this to the change to IGCSE feeding through to improved A level results. …where it has helped is in an increased awareness of science and scientists,

Pupils who are less able are also enthused:

IAS helps to motivate the students. Particularly those students who have been on a applied pathway and are perhaps not as able, they valued the experience and used it to complete assessed work towards their GCSE.

4.25 Is there any evidence that science results have increased in the last few years (and obviously this will be down to a number of strategies) do you feel IAS helped and if so in what way? Do you feel that it has helped improve numbers of students taking Science either at GCSE or A' level?

Many (22%) said; *Not as yet* and *unable to tell* as often no real data analysis seems to have been done in schools to look at impact of different strategies:

> *Probably not! All our students take science at GCSE, the choice between dual award or triple science usually being determined by what other subjects girls would like to take. At A level we have always had a good take-up of all three sciences. The effect would not be seen yet anyway, as the first group to do IAS are now in year 11. Ask again next year!*

Others said (8% i.e. 2 teachers) felt that (t)*his doesn't have a direct impact for our college course* but many felt that there was a clear change in student attitudes or their uptake of science courses (76%) responses are more positive:

> *I would say the interest has definitely increased, but not to sure about the exam results, I think for this you would have to look at the bigger picture and not just be reliant on IAS, although IAS has definitely given the pupils the skills to help them on their way,*
>
> *Possibly - although we have just changed our option structure, and included an open ended practical competition where students design there own experiments. Too many variables to be sure if it's had an impact. Students were very keen to get on with the live chat and discussed this outside of lesson time,*
>
> *Yes – a much bigger cohort have taken up A'Level.*
>
> *I would say the interest has definitely increased, but not to sure about the exam results, I think for this you would have to look at the bigger picture*
>
> *We have seen an uptake of numbers of pupils picking triple science - however I don't feel this is purely down to IAS*

4.26 What other informal activities that you book in for your science students do you particularly value and why? Are these free or do they have a charge?

Almost all schools use free events and activities, undertaking a small number every year:

> *Just free internet activities or enquiries found on internet,*
>
> *Talks by those in industry (costs a bottle of wine),*
>
> *Free visit to MMU museum debates. Again meeting scientists and the work that they do, schools careers advisers don't even know these jobs exist!,*
>
> *The pupils love to get out of the classroom and a hands-on approach. I have taken numerous trips to Manchester Museum to free science workshops,*

> *We really enjoyed the Biology Challenge this year.* http://www.biology-olympiad.org.uk/biology-challenge/ *….It does have a charge, but it's fairly nominal – about £25 for the whole school I think.*

However, with budgets getting tighter teachers did not expect that they will be able to continue with paying for more than a very few things:

> *Our students take part in a range of other activities, speakers may come in to class, they take part in study days both in school and at the Natural History Museum in Oxford; the Year 7 favourite is Dinosaur Day. I have had the bug lady come in and bring some of her animals. Most of these activities cost very little, except for the transportation. We would not be able to take part in both weeks if there was much of a charge,*
>
> *The fair costs £450 in total to run, if I could put everyone in one year group through the program for the same cost it would be good value for money.*

4.27 Would you feel that the school would pay a similar amount for IAS?

Most teachers reported limited funds:

> *With reductions in school budgets and loss of the science specialism funding booking scientific activities that cost will be less likely to occur. I suspect most schools are in the same position with about a 20% reduction in funding, not great times!*
>
> *If we paid for this we would not be able to pay for other experiences and would have to choose,*
>
> *The science department has a tight budget and it would be unlikely that this would be something that funding would be spent on,*
>
> *If you charged for IAS I would have to ask my head of department to fund it from our budget, but if it was a small charge I don't expect that would be a problem.*

One point to note is that if charges were made the opportunity for some pupils to join would end:

> *Our school has a large number of free school meals and the science department in particular is quite poorly funded, but I think IAS being free is a brilliant scheme for our pupils and pupils from other areas similar to ours in which their background may be quite deprived as they would never get the chance to speak to professionals otherwise,*
>
> *I'm afraid they probably wouldn't, it has been made clear that money is tight. I could bid for a donation from the school parent & teacher fund.*

On a more positive note, teachers from colleges do have larger budgets and are keen to be involved:

> *I think that the college would pay a reasonable fee for IAS; however the later stage (June event) was too late in the year for our college to take part as all our students had already completed for the year and therefore we felt that it was geared more towards schools and not colleges.*

It is clear that if a fee was to be charged to schools it would need to be small – tens of pounds rather than hundreds and they might well want more for their money:

> *Yes, I think the school could pay for IAS. However it will depend on various factors - cost, length of the event (it would be nice to have a extra week or so to ask questions (not the chat side) - this event has been better for that), the scientists involved as well,*
>
> *I wouldn't push it if it were not free...the bit which is best is talking to the scientists and we found that we don't get enough slots, I would like to have 2 per week with each class.*

Feedback from teachers in the **Quantum Zone**, funded and recruited by the Institute of Physics, showed similar responses to IAS impact:

> *I used the IAS with a year 7 Science Club group and it was a great way of enthusing the students about science as a future. If I were to use it again I would use it at year 10/11 where the students are thinking about their future careers etc.*
>
> *I have discussed the IAS with my colleagues in the department and they have been very excited about the prospect of using it as an enrichment activity for students on changing their perception of scientists and perhaps even developing a project around it where they research a particular scientist/we put them In touch with contacts of our own to help them understand it.*

Despite this enthusiasm there was comment that paying for such an activity would be difficult.

Feedback from one of the first **primary schools** to be involved suggests that IAS works very well with younger pupils too:

> *The children were very well engaged with the project from the outset (I used a combination of your lessons 1 and 2 as our starting point). Using the materials, they were able to engage in detailed discussion in small groups and then as a whole class. They considered the "value" they would place on scientific enquiry in general and of a range of different areas of enquiry. They were also able to establish their own, individual criteria for assessment of the scientists in our zone and to think about how they would decide if these criteria were met.*

Increasing enthusiasm for science so early might well have a greater impact on choices for GCSEs and warrants longer term evaluation. This primary teacher worked with Gifted and Talented pupils and made suggestions on how it might work effectively with a wider mix of pupils:

> *We did not use the project for whole class teaching and I came to it with a science specialism. I think all of our staff could use the project in a modified/slimmed down form, particularly the live chat and would find it a great way to generate enthusiasm for science in their classes. Could you arrange zones using scientists working on subjects related to those studied in particular year groups (e.g. rocks and soils zone, sound zone, conductors zone)?*
>
> *If adapted more for KS2 and shortened/offered at different times of the year to increase flexibility of planning.*

The feedback suggest that the attitudinal change – *they will be much more open to new scientific ideas, will appreciate the relevance of understanding new areas and will be able to place these in a broader scientific background* – is really central to the impact upon pupils.

4.3 Other feedback from teachers

Follow up interviews with teachers from two case study schools from 2010 concurred with the survey feedback (see Appendix 3 for full data). The teachers from West Thames College and Matthew Arnold School highlight the increased enthusiasm and motivation that pupils gain from this event. The opportunity to develop wider understanding of science and of role models is a central reason for taking part.

4.4 Informal feedback from scientists

Informal discussion with 4 scientists from the Energy Generation and Microbiology zones centred on what they felt they had gained from being part of IAS (for full data see Appendix 5). All of them enjoyed the event and stated it was an *imaginative use of web communication in science.* They stated the following outcomes:

- Increased ability to communicate with students,
- Increased ability to talk about their work in everyday language,
- A greater sense of enthusiasm for their work,
- Satisfaction in supporting students in understanding but also in inspiring them in science,
- "Refreshing" themselves – the pupils had a strong idealism and are optimistic in making a different and better society,
- Opportunity to reflect.

> *"Personally I think this is the best science engagement scheme I've been involved in – and the benefits aren't just for students. You may start thinking about your research in a whole new light after having to explain and defend it to the harshest of critics"*
>
> Scientist, June 2011

The scientists enjoyed the chats for the more personal links that these offered with pupils, but the off line Q&A approach offered opportunity for more detailed answers to be given. They found that there were a number of areas that cropped up regularly such as working with animals and religion and these might be a focus for further teacher and pupil support. They also felt it was good to hear from a wide range of students from different backgrounds but also to make contact with scientists in other institutions and fields.

Scientists were also impressed that some students took time out of school to research topics and ask questions. They did feel that there *was some mileage* in being able to pass on to another more appropriately specialized scientist, questions that were not specific to their own zone.

Scientists from the Healthy Ageing Zone were funded by RCUK and as part of this had access to training too. Feedback agreed with other scientists in that it was enjoyable but time consuming:

> *Time was something of an issue. I'm not sure if there was an advantage to be the first person to answer a particular question, but with questions appearing seemingly at random, it made*

> *it hard to schedule a specific time. If questions were released by the moderators at set times each day, that might have made this a bit easier.*

Another issue raised in an interview with a scientist from this zone:

> *I know this was probably a consequence of how the Healthy Ageing Zone was funded, but it was a little intimidating to be the only one in the group not based at Newcastle. Might be worth trying to encourage wider participation if this is going to happen again in subsequent years.*

However he felt that colleagues were supportive:

> *My boss encourages participation in public engagement activities, and has been supportive of my colleagues who have participated previously, and the knowledge transfer officer in our department was also rather keen.*

In fact several have already made a note sign up for next year!

4.5 Feedback from Stakeholders

Questions were asked of RCUK, Institute of Physics, London Beacon and Beacon for Wales about what they wanted IAS to achieve for their organizations and their commitment for the future. For full data please see Appendix 6

4.51 How do you feel it has gone (from your point of view)? What benefits have there been?

All stakeholders felt that IAS had gone well and that it had fulfilled their key aims:

> *One of our key aims is providing an opportunity for our researchers to undertake public engagement, as well as inspiring young people to follow research careers, study beyond 16 and become more informed citizens*
>
> *Feedback from teachers suggests it has been very good – although we haven't done any formal evaluation. We have also had some independent A' level students using it – and they have enjoyed it too,*
>
> *It has fulfilled our aim to engage with society – and this approach means that we reach more remote schools and the programme is nicely student lead. They were interested in science, research, the process etc,*
>
> *Putting physicists in contact with school students is an important part of the Institute of Physics' work – and online engagement is an important strand to this. IAS has proved to be a very useful vehicle and has allowed our members to get involved without geographical constraints.*

4.52 Have there been any issues? Do you feel you are involved enough?

The only issue mentioned was the short planning stage and that in future there need to be a little longer to plan and develop:

More planning time would have been useful - especially as this is our first year of doing this. However, it ran very well, all things considered.

Overall we were very pleased with how it went and it was brilliant to see the questions young people were asking. We agreed an approach with Gallomanor, who were very accommodating although next time a longer planning stage would be useful. A plus point was the optional training offered to researchers to help prepare them and develop their skills. We have had positive feedback from those taking part but that expectations regarding time commitment need to be managed and it would be fantastic for the scheme to sign-post researcher to other opportunities and support for public engagement once they have taken part or if they are unsuccessful in the application process.

4.53 How much do you need to invest in staff time to make it more worthwhile?

Stakeholders were happy with the levels of involvement and felt that Gallomanor were helpful and adaptable:

We were very involved – logged in and observed. Gallomanor were very accommodating. I wouldn't need more time – I saw the questions etc,

The involvement level is about right. After seeing it IAS in operation for the first time, next year we intend to get more involved and assist the winner in their outreach activities and support them to in develop a successful project with the winning money.

4.54 Has it been value for money? Would you be involved again?

Feedback gave a resounding yes to this question with some already planning to be involved again:

Yes – we are currently looking at our strategy and our future spending. We are interested in doing this again but we need to wait for the strategy review. Is very good value as it is an online approach – and thus less expensive – and complements our programme of researchers into school. You need both approaches as our other programmes develop longer lasting relationships. This is though a good new way to engage the public.

Yes – although this might depend on the scale we undertake next year – this initial testing phase for us has gone very well. We can offer this to our network of schools. One of our key aims is to engage students that would not normally consider taking physics at A-level and show them that physicists are normal people and that the subject is both exiting and challenging. IAS can make a real impact on this because the students are free to ask what they want.

4.55 Do you feel if fulfills the remit to engage society more?

All stakeholders felt that their remit to engage with the public had been fulfilled in an interesting approach:

Linking scientists to the scheme meets the aims of the Beacon for Wales in terms of getting more people involved in public engagement activities and in terms of being seen as a broker between schemes and Welsh academics.

For the institutions that the scientists belong to, I think that the benefits are quite peripheral as they are limited to a couple of individuals and there has not been the sort of local, or even national, coverage that universities value. The institutional benefits are related to the increased ability of scientists to explain their work, a better understanding of what (and how) young people in schools are taught about science which can help with undergraduate teaching and, possibly, the links that some academics may have made with scientists in other institutions which may have a longer term collaborative benefit.

5.0 Data from June 2011

This section contains data collected from the 23 zones in the June 2011 event. It demonstrates the type of data an online event can collect and provides information on popular topics covered in questions asked by the students.

5.1 Key statistics from the June 2011 event

Table 5. Key statistics from the June 2011 event. The number of questions approved indicates questions posed to scientists – the remainder were either duplicates of existing questions or inappropriate.

	Whole event	Average: general zones	Average: themed zones	June 2011 Average
Students registered	7187	278	350	312
Teachers registered	272	11	13	12
Live chats	333	13	16	14
Lines of live chat	101,811	3931	4967	4427
Questions asked	21,359	874	989	929
Questions approved	8620	336	417	375
Question answers	17,836	774	777	775
Votes cast	6312	241	311	274
Comments	3864	133	206	168
Teacher packs sent	501	22	22	22
Classes took part	312	12	15	14

Table 6. Site statistic pageviews since the site was built in March 2010, and from the 2 months surrounding the June 2011 event.

Page(s) viewed	Total visits since the site was built		Visits during the June 2011 event – 23rd May – July 18th 2011	
	Pageviews	Unique views	Pageviews	Unique views
Whole site	1,816,719	1,140,050	723,694	438,860
ASK	81,401	21,253	37,992	10,127
CHAT	90,918	31,141	49,123	14,573
VOTE	22,056	15,355	10,889	7,544
Profiles	86,285	29,995	38,141	12,840
Scientists	46,761	30,117	21,745	13,918
List of questions	26,263	10,575	10,466	4,721

5.2 Question keywords

The keywords in the questions asked to the scientists in each zone were tagged. The popular keywords indicate the topics of interest in the different zones. Themed zones see an increase in the number of keywords in questions about that theme.

The size of the word in the boxes below represents its popularity; the superscript number indicates the number of times it was tagged as a keyword in questions in that zone.

accent[18] alcohol[15] animal[44] baby[10] best[15] big bang[11] **brain[77]** cannabis[32] cell[16] child[27] colour[11] control[11] depression[14] die[15] dream[33] drug[35] earth[11] electricity[18] enjoy[15] experiment[39] favourite[27] hair[13] how long[12] human[19] IAS[11] interest[14] job[37] language[14] marijuana[12] memory[31] microscope[13] organ[12] people[12] research[44] school[14] science[25] **Scientist[53]** sleep[14] smoking[12] space[13] speech[13] study[13] weed[14] win[14] work[41]

Brain

age[31] **alien[45]** animal[24] benefit[14] blood[14] brain[30] career[29] cell[21] colour[15] cure[13] diabetes[12] die[12] disease[12] earth[27] earthquake[17] end[15] enjoy[28] evolution[20] experiment[25] favourite[34] gravity[14] grow[12] hair[17] human[33] IAS[23] inspire[15] interest[12] job[36] money[15] moon[16] nasa[13] planet[36] research[30] rocket[13] school[19] science[19] **scientist[70]** **space[51]** subject[18] sun[19] travel[23] universe[20] water[17] work[32] world[25]

Calcium

age[31] **alien[45]** animal[24] benefit[14] blood[14] brain[30] career[29] cell[21] colour[15] cure[13] diabetes[12] die[12] disease[12] earth[27] earthquake[17] end[15] enjoy[28] evolution[20] experiment[25] favourite[34] gravity[14] grow[12] hair[17] human[33] IAS[23] inspire[15] interest[12] job[36] money[15] moon[16] nasa[13] planet[36] research[30] rocket[13] school[19] science[19] **scientist[70]** **space[51]** subject[18] sun[19] travel[23] universe[20] water[17] work[32] world[25]

Chromium

age[31] **alien[45]** animal[24] benefit[14] blood[14] brain[30] career[29] cell[21] colour[15] cure[13] diabetes[12] die[12] disease[12] earth[27] earthquake[17] end[15] enjoy[28] evolution[20] experiment[25] favourite[34] gravity[14] grow[12] hair[17] human[33] IAS[23] inspire[15] interest[12] job[36] money[15] moon[16] nasa[13] planet[36] research[30] rocket[13] school[19] science[19] **scientist[70]** **space[51]** subject[18] sun[19] travel[23] universe[20] water[17] work[32] world[25]

Cobalt

advice[6] best[9] body[9] **cancer[46]** chemical[7] cure[14] death[8] die[10] difficult[7] disease[6] drug[6] earth[9] enjoy[19] environment[6] experiment[13] favourite[24] food[11] grade[7] hard[7] help[7] how long[15] how old[9] human[10] inspire[11] interest[10] invent[12] **job[34]** life[8] money[11] people[14] planet[9] religion[9] research[27] school[25] **science[48]** **scientist[57]** space[10] study[12] travel[8] university vote[7] weight[8] win[13] work[18] world[6]

Copper

age[5] animal[14] behaviour[4] best[9] **cancer[30]** **crayfish[46]** cure[11] discover[7] end of the world[4] enjoy[7] environment[6] evolution[4] experiment[10] fact[5] **favourite[36]** fish[10] fun[4] future[5] grade[4] hate[4] inspire[7] **interest[34]** job[21] like[8] maths[4] money[11] music[5] opinion[5] pay[5] pet[4] population[4] prize[5] research[5] rubbish[4] salary[5] **school[32]** science[18] **scientist[37]** spare time[4] study[12] subject[4] vote[8] where[4] win[9] young[5]

Ecology

about you[6] alien[5] alternative job[5] ambition[5] apocalypse[6] **being a scientist[23]** benefit[7] best[5] car[9] **career[16]** chemistry[5] computer[4] difficult[6] earth[9] electricity[5] end of world[9] energy[10] evolution[5] experiment[12] favourite[8] fuel[8] future[10] goal[4] gribble[11] heart[5] heart disease[6] human[6] hydrogen[8] IAS[8] inspiration[11] interesting[6] **job[15]** motivation[14] petrol[4] prize[6] money[6] qualifications[4] **research[18]** school[11] **science[15]** scientist[7] time travel[9] tsunami[5] universe[6] university[9] water[5]

Energy Generation

2012[10] **animal[56]** attracted[8] attractive[8] best[8] body[9] career[9] change[10] children[9] colour[11] darwin[12] earth[12] enjoy[10] **evolution[40]** evolve[13] experiment[10] favourite[10] fun[15] funny[8] future[20] hair[9] **human[47]** humans[9] IAS[15] job[24] life[25] light[9] mars[10] personal[10] planet[22] prize[9] reproduction[9] research[17] school[14] science[27] scientist[32] sex[13] solar system[11] **space[36]** species[12] theory[9] time[10]

Evolution

animal[2] big bang theory[3] bone[6] cancer[13] cancer cell[5] career[17] cell[2] chicken[2] **crime[11]** crime scene[6] csi[5] cure[6] detective[2] enjoy[5] evidence[4] evolution[4] favourite[3] finger[4] **fingerprint[10]** finger print[5] forensic[2] forensic science[6] future[4] identify[6] important[2] inspiration[5] inspire[6] interesting[4] investigate[3] investigation[3] **job[39]** mars[2] medical[4] medicine[3] personal[3] research[3] scientist[4] shot[2] society[3] space[5] study[3] subject[3] treatment[5] unique[4] work[5]

Forensic Science

animal[15] bacteria[14] biology[8] blindness[8] body[16] cancer[22] career[30] cell[18] cure[24] device[9] DNA[34] drug[9] evolution[11] experiment[23] eye[15] free time[8] fun[20] future[32] gene[29] genes[19] health[19] human[34] IAS[15] illness[8] investigation[13] job[39] life[8] machine[9] medicine[11] money[15] people[10] personal[8] prize[10] research[24] school[20] science[37] scientist[36] space[15] spare time[8] time[10] travel[8] virus[9] win[8] work[38] world[9]

Genes

age[11] ageing[18] alzheimers[7] brain[17] career[56] cell[11] cells[13] chemistry[9] cure[19] death[18] die[6] diet[18] disease[46] dna[11] dying[8] eat[17] enjoy[16] food[17] future[12] gene[10] genes[14] genetic[8] genetics[6] health[15] history of science[8] i'm a scientist[6] illness[33] inherit[6] job[21] mitochondria[14] mitochondrial[15] older people[18] parkinsons[22] personal[16] protein[13] religion[7] research[15] school[12] scientist[49] society[7] space[9] treat[11] universe[10] university[7] work[19]

Healthy Ageing

alien[10] animal[15] career[28] chocolate[10] cure[11] disease[8] experiment[17] favourite[20] food[43] free time[11] fun[17] future[17] health[8] human[8] IAS[22] interesting [9] job[59] life[14] light[11] malaria[21] neutron[13] ocean[7] personal[11] physics[9] picture[10] planet[12] polio[7] prize[8] research[22] school[30] science[33] scientist[43] solar system[10] space[35] star[29] stars[13] submarine[17] submarines[10] time[9] travel[9] universe[27] vaccine[10] win[9] work[36] zombie[7]

Iron

adhd[9] age[5] animal[30] animal testing[4] bacteria[7] best[11] cancer[11] cure[6] dangerous[6] disease[4] end of the world[5] energy[10] enjoy[12] environment[6] experiment[17] favourite[14] food[5] fusion[9] future[4] grade[4] harm[5] how long[4] how old[5] human[5] interest[10] job[19] marine[4] mice[4] nuclear[5] ocean[4] research[30] school[12] science[25] scientist[32] sea[7] society[9] space[5] spare time[4] subject[4] technology[6] test[4] testing[8] topic[5] university[4] work[23]

Manganese

2012[3] animal[7] best[16] camera[4] coral[3] danger[6] dangerous[4] day in the life[5] deep sea[3] discover[4] dive[3] dived[3] enjoy[11] evolve[3] experiment[5] fascinating[4] favourite[28] field[4] fish[15] furthest[4] help[4] Interest[18] jellyfish[5] job[35] like[8] milk[5] money[9] octopus[5] organisms[5] pay[7] prize[5] research[3] salary[3] scientist[17] sea[12] sea spray[4] shark[3] typical day[5] underwater[5] venom[4] visit[4] vote[7] weird[4] win[8] work[8]

Marine

achieve[2] age[7] bacteria[6] behaviour[16] benefit[3] cancer[20] carbon dioxide[3] ceramics[2] children[3] co2[3] cure[7] current research[5] decide[2] discover[4] earn[2] enjoy[2] environment[3] evolution[2] experiment[6] favourite[12] global warming[2] improve[2] inspire[3] inspired[2] interest[8] job[10] like[4] money[8] mri[2] old[2] pepsi[2] plants[2] plastic[6] plastics[3] plates[3] qualifications[2] school[5] science[4] scientist[22] sense[5] smash[2] sound[2] study[4] t-cells[5] win[7]

Microbiology

£500[8] 2012[11] aeroplane[11] africa[11] animal[9] brain[18] career[10] colour[7] computer[16] dangerous[8] death[7] discover[12] earth[18] end[9] enjoy[9] environment[8] evolution[11] experiment[20] family[6] favourite[7] future[7] hair[10] human[15] inspire[7] invent[8] job[16] life[16] lightning[22] love[8] money[21] people[7] plane[19] planet[7] research[26] science[22] scientist[33] sight[7] space[8] time[11] travel[9] universe[16] vote[7] win[7] work[17] world[20]

Nickel

achieve[2] age[7] bacteria[6] behaviour[16] benefit[3] cancer[20] carbon dioxide[3] ceramics[2] children[3] co2[3] cure[7] current research[5] decide[2] discover[4] earn[2] enjoy[2] environment[3] evolution[2] experiment[6] favourite[12] global warming[2] improve[2] inspire[3] inspired[2] interest[8] job[10] like[4] money[8] mri[2] old[2] pepsi[2] plants[2] plastic[6] plastics[3] plates[3] qualifications[2] school[5] science[4] scientist[22] sense[5] smash[2] sound[2] study[4] t-cells[5] win[7]

Phosphorus

about you[18] being a scientist[38] benefit[25] best[13] big bang[12] black hole[12] career[21] computer[15] cure[11] dangerous[9] diamond[16] difficult[15] discovery[14] disease[9] enjoy[19] exciting[14] experiment[22] favourite[28] help[16] IAS[33] important[10] inspiration[26] interesting[18] job[18] laser[26] LHC[11] mass[9] motivation[25] nano[11] particles[9] physics[14] planet[10] plasma[13] prize money[22] quantum[25] research[38] role model[9] school[29] science[30] scientist[22] space[13] temperature[12] universe[27] university[27] young[11]

Quantum

ageing[4] alien[4] antarctica[3] antartic[4] astronomy[19] cancer[7] career[36] cell[5] child[9] children[8] creative[5] creativity[4] cure[6] discover[7] discovered[4] discovery[10] disease[3] drug[7] drugs[6] enjoy[14] family[3] favourite[4] global warming[18] greenhouse effect[6] growth[3] ice caps[10] imagination[5] imagine[4] interest[4] interested[4] job[11] medicine[8] personal[6] research[7] school[8] scientist[38] sky[7] space[10] space travel[3] star[4] stars[5] travel[5] treat[7] treatment[6] work[11]

Scandium

500 pound[9] ache[8] animal[11] app[8] athlete[11] body[30] brain[31] breath[8] career[49] data[10] disabilities[8] disease[12] exercise[38] experiment[8] fatigue[11] favourite[29] growth[8] hair[9] height[8] human[14] improve[9] injury[9] job[70] learn[8] money[8] muscle[15] nutrition[18] people[13] prize[10] psychology[12] research[20] run[19] school[18] science[12] scientist[11] skin[13] social[8] space[10] speed[9] sport[32] study[15] subject[24] tendon[12] win[10] work[11]

Sports Science

2012[7] animal[7] animal[10] testing[10] astronomy[14] benefit[24] body[10] career[50] creation[7] death[7] enjoy[13] evolution[9] experiment[19] favourite[9] frog[12] frogs[24] future[13] GCSE[9] help[8] hobby[8] human[7] IAS[6] interest[15] interesting[8] job[19] lab[7] labour[18] material[8] money[9] periodic table[8] personal[9] pregnancy[10] religion[7] research[36] safe[10] school[21] scientist[53] society[16] space[9] squirrel[7] treat[7] tree[9] tree frogs[18] universe[7] work[21] world[11]

Sulfur

astronomy[7] benefit[7] blood[4] bored[2] boring[4] cancer[3] career[42] chemistry[5] clone[3] competition[2] cure[3] earth[3] eat[3] education[5] electricity[3] engineer[3] engineering[3] enjoy[13] exam[7] experiment[5] fail[2] favourite[3] food[3] football[5] future[3] gcse[6] gene[2] I'm a scientist[4] job[9] lab[5] personal[3] physics[4] qualification[2] qualifications[2] research[8] school[10] scientist[36] sea lion[4] sea lions[9] society[8] space[3] vampire[3] win[2] work[8] world[3]

Titanium

500 pound[7] 2012[10] ambition[6] animal[13] benefit[8] big bang[6] black hole[6] cancer[37] car[16] career[21] colour[6] cure[18] discovery[6] disease[18] enjoy[7] environment[6] ethics[6] evolution[8] evolve[8] experiment[11] favourite[15] fossil[15] future[14] human[10] IAS[8] immune system[8] job[39] money[8] moon[6] palaeontology[7] planet[9] pollution[7] research[25] school[12] science[13] scientist[9] social[6] society[7] space[18] subject[6] sun[7] test[6] treatment[6] win[10] work[20]

Vanadium

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Appendices

Appendix 1: Evaluation approach

Objectives

Summative Evaluation Objectives*:*

- The extent it met its remit to inform public engagement
- Was it *value for money?*
- What worked well and not so well?
- The learning for sector for public engagement with science
- The value to scientists and their organisations

Evaluation Objectives for scientists:

- The extent of change – new skills, confidence, changing views on public engagement, young people, science etc
- How successful was the recruitment of scientist and are there barriers to recruitment?
- The identification of most appropriate ways to attract
- Were scientists expectations met?
- The different impact depending on type of scientist etc
- Are they more likely to do public activity again?

Evaluation Objectives for teachers:

- The extent pupils have changed – attitudes, empowered, more discussion in class etc
- Is *I'm a Scientist* (IAS) valued by teachers?
- Whether teachers have changed their practice?
- Were they supported enough?
- Is the content in a useful format?
- Are the debate kits useful?
- Are their expectations met?

Evaluation Objectives for students:

- Have their attitudes to science changed?
- Have they gained empowerment to make decisions relating to science?
- Are they more confident in asking questions and contributing to discussions?
- What is the biggest impact of IAS?
- Were they inspired by scientists?
- Did some types of classes etc benefit more?

Longitudinal Evaluation Objectives:

- Did students gain any long-term impacts of IAS eg attitudes to science, confidence, taking science further in studies etc?
- The extent to which scientists had been changed through participating in IAS new skills, confidence etc
- The different amount of change within scientists
- What are the new skills developed by teachers?
- Were teachers inspired to use new approaches in the classroom teaching?

Key Questions for teachers who have taken part in more than one IAS:

- How valuable has IAS been in your science teaching in terms of linking informal learning approaches to the National Curriculum, GCSE course work etc?
- How valuable has IAS been in your science teaching in terms of developing skills and best practice for you and your colleagues?
- How valuable has IAS been in your science teaching in terms of the development of your pupils?
- Have you noticed any greater interest/achievement as a result of IAS? Is there any feeling that science results have increased in the last few years (and obviously this will be down to a number of strategies) do you feel IAS helped and if so in what way?
- What other informal activities that you book in for your students do you particularly value and why? Are these free or do they have a charge (and if so what)?
- Would you feel that the school would pay a similar amount for IAS?

Key evaluation methods: 2010

- Survey for scientists, teachers and pupils
- Case studies
    - The Matthew Arnold Secondary School (Spelthorne, Surrey) Year 10 – a preparation lesson and a chat room lesson
    - West Thames College (Isleworth, Middlesex) – Year 12 – a preparation lesson, a chat room lesson and a plenary session
    - John Hampden Grammar, High Wycombe, Bucks – Boys Grammar Year 10 – A chat room lesson
    - The Warwick School, Redhill Surrey – Year 10 – 2 classes having a chat room lesson
    - Sacred Heart School, Hammersmith – Year 10 – double lesson – use of website with questions via email
- Observe sessions in school. It was hoped to have gone further in geographical terms but logistically this was not possible. However the schools visited do offer a sample that covers range of ability, mixed and single sex school, cultural background and class.
- Interview teachers in schools

- Interview teachers by phone
- Interview / focus group with scientists
- Develop links with schools who have used IAS several times and possibly visit 2 schools in June 2010 that have undertaken IAS before to get feedback from teachers
- Interview scientists

Key methods: 2011

- Survey for scientists teachers and pupils
- Personal Meaning Mapping with students (as used by Falk and his colleagues in museums in 1998 and uses coding along four parameters: extent of vocabulary used, number of different concepts invoked ("breadth"), depth of understanding, and emotional intensity to look at mind maps. The online PMM responses (Stephanie Thompson and Rick Bonney) also used extent, breadth, and depth but used a more in-depth approach than that possible with the data collected for IAS. In this evaluation we will discuss the change of attitudes to science through the changing use of key words.
- Case studies – personal meaning mapping and review of homework reviewing IAS at Matthew Arnold School
- Interview teachers with regard sustainability and impact, (particularly those involved over a number of years)
- Interview scientists and other stakeholders
- Comparison of survey data collected since 2008
- Review of questions students asked to look for changes in type of question. As most students only did one chat session the data did not show any significant changes.

Appendix 2: Teacher feedback

Survey of teachers who have been involved for more than one IAS event

The survey was sent to all 125 who had been involved for more than one IAS event. Responses were received from 23.

Schools involved

West Thames College - interview
Matthew Arnold Secondary School - interview
Abingdon School
Broadlands School, Bath
Broadoak Maths and Computing College
Chafford Hundred Campus
Colchester Girls School
Great Marlow School
Harrogate Ladies' College
John Hanson School
Kingsmead Community School
Lampton School Hounslow
Macclesfield College
Mid Cheshire College
Our Lady's RC High School, Manchester
Plymstock School
Smithycroft
Somervale School
Sutton High Sports College
The Priory
The Robert Napier School
Thomas Alleynes High School
Toftwood Primary

Feedback

How valuable has IAS been in your science teaching in terms of linking informal learning approaches to the National Curriculum, GCSE course work?
I didn't use for this purpose
I have found IAS immensely valuable to the classes I have taught using it. The pain way that it links in is wit the how science works concept of the curriculum.
Have used IAS for KS3 students, I have found it extremely helpful in linking science to real situations and also for the students to talk to scientists- which is a fantastic opportunity for them!
It has been useful in getting students to think about reliability of evidence and in thinking about scientific careers.
I teach BTEC first and extended nationals. The main focus of this type of qualification is to link

science to the real world. So this is IDEAL!!! You should contact more schools and colleges delivering this type of qualification.

IAS has been brilliant in informal learning approaches, the pupils have gained many skills which they were lacking in such as much better communication skills, gain in confidence and an idea of careers and professions out there and how these fit into real life, this links in nicely to AF2 (Understanding the applications and implications in science) and AF3 (communicating and collaborating in science) as part of our APP programme for KS3.

Given them a wider and broader picture of Science and where it can take them.

Brilliant for the stem cell section to help relate what they were learning to real life.

IAS has helped to incorporate other modes of ILT within our science classes and has been an integral part of the units taught (Stem cells was increasingly relevant to our unit of Genetics & genetic engineering within the BTEC Extended Diploma Applied Science).

We have found IAS to be very useful in terms of making scientific links.

Really enjoy doing the project but look at it more from a motivation and awareness of careers view point. I've also only done it with higher ability groups.

I wanted the students to think outside the constraints of their usual science lessons, especially thinking about design of experiments and how new discoveries are made & verified. I wasn't really trying to link with any National curriculum or GCSE syllabus.

We teach IGCSE, rather than the National Curriculum. This qualification has less emphasis on How Science Works, and also does not involve any coursework. So IAS perhaps does not link so neatly to the curriculum for us.

I have mainly used IAS each time with KS3 groups. I have used it to link How Science Works to the topic of study, so far I have been luckly for our Zone to be the same as the topic.

Very, it really has helped us to highlight how science works in reality. In terms of GCSE coursework it has helped prepare our students for looking at different viewpoints, and develop a broader awareness of ethical issues.

It has been used as summary to a space unit for our year 7's. They had the opportunity to task a range of questions to the scientists that myself as non-specialist couldn't answer as fully as a scientist.

Fantastic some aspects, but I had hoped that the lesson sheets would be more relevant to the zones each time not the same for the past 2 years.

IAS gave an invaluable opportunity to students studying applied Science GCSE to converse with actual scientists, this informed their coursework on career in Science. All students who have been participating have really enjoyed the chance to contextualise the use of Science within different roles outside education.

IAS has been extremely valuable in this context. It has allowed me to use a completely new learning

approach in my classroom which does not involve the formality of usual classroom lessons.

We have managed to choose zones/themes that link to science that we have done or are doing as part of the curriculum so has been brilliant to link the roles of scientists to the curriculum they do.

IAS has been useful in covering the HSW aspects of the specification and has given students an insight into potential career pathways in science.

How valuable has IAS been in your science teaching in terms of developing skills and best practice for you and your colleagues?

Not at all.

In terms of my own development it has enhanced my use of ICT in lessons. I was fearful at first at allowing students to blog but after the initial excitement and clear instructions they loved the change and chance to talk to the scientists.

It has helped me and other members with aspects of topics and completing debates or even inspired lessons from angles that we had not thought of with out the debate cards.

Good for developing a clear question, in particular a closed question. Also for considering how you make a judgement on importance - ranking in order of priority.

Good teaching support resources, showing lesson planning is key to lesson success.

For myself, it improved my ICT skills and also gave me the chance to teach less teacher led lessons and hand over more to the pupils, this was a valuable experience and I think it has improved our working relationships together.

IAS has encouraged us as a team to incorporate more interactive IT based sessions within our science classes and also within the science practical's.

IAS has not had much impact in terms of good practice for us.

It has developed students questioning techniques and research skills as we tried to show that some of the questions students asked could be answered themselves by simple research.

Not really – I have not used skills from IAS in other teaching, and my colleagues have not been involved – I ran the programme myself, for my classes.

I think it is a great resource to use with ICT. I am the only one to use it within the department (I have offered it). We have used the Energy MC which is similar however I think myself that IAS is much better. I learn things from it and so I can bring a unique way of approaching it in the classroom.

Excellent- staff have a greater scope for teaching activities for embedding understanding.

We haven't really used it for this.

I use it to enhance my current teaching, I don't use the leveled sheets, but I do use the debate kits, I would like more resources based around the zone topics..I would be keen to get more involved in planning, ideas etc too.

As four groups are under taking the June event (so fives classes and five teachers have used the

site), there has been a lot of discussion regarding effective delivery with the sharing of best practice.

Again very valuable. Our biology department has used IAS for the first time after hearing how much my pupils enjoyed their IAS experience and what they learned from it too.

The skills developed have been about letting the students have more freedom, it gives staff the opportunities to build different relationships with the students as they themselves engage with IAS.

How valuable has IAS been in your science teaching in terms of the development of your pupils?

Developing their interest and realising how science is used has been great .

Pupils relished the chance to talk to real scientists. They had to research each scientist before and find out which university they were working at and this opened many student's eyes to the world of academia and the chance of studying for a degree. It of course also gave them the chance to use a different media in class.

Especially for my year 8 it has been a very good experience for them, debating, talking to scientists, engaging with science and developing their ideas of what being a scientist is like.

This is rather a broad question and not very closed! It is positive in terms of the development of their scientific thinking and how broad scientific careers can be beyond doctor, dentist, chemist etc.

Last year very well received, this year not so much. But I did not introduce it as well as I had done in previous years. Plus we had already covered some of the lessons so it was going back over work for them.

The students have really enjoyed the interaction with the scientists and this has helped develop their confidence and curiosity.

It has definitely had an impact on the development of our students, they were able to follow their own areas of interest and go 'off piste' from the NC.

It has highlighted careers in science more and also highlighted up to date research. The students really found the variety of scientists to be a benefit, as obviously members of the group have different preferences in terms of topics they are interested in. It has helped to develop more independent thinking.

Valuable – it has opened their eyes to science as a possible career choice, and also given them an insight into what exactly scientists do all day. In a girls' school, it is important to have strong female role models connected with science, and to promote science as a career choice for girls, and IAS has provided these.

Pupils always find it engaging and get into the events. It is also a great way to show pupils the bigger to what they are learning in the classroom to the wider world.

Very, as mentioned above it really has helped students develop their scientific enquiry skills.

It has engaged the pupils and lessons after they keep asking are we doing I'm a scientist again. It has shown pupils that not all scientists wear white coats and become teachers.

Great for 6th form understanding and inspirational to younger pupils who have yet to decide what they want to do.

It has been a good activity to develop student's use of technology within Science, this has been the first time live chat has been used within the curriculum at our school. Given the changes towards electronic work submission and collection and the use of school systems to provide feedback in this way with the introduction of a new VLE it has been very timely.

IAS has inspired more pupils to consider careers in science. Being an east end school in Glasgow science is not usually considered by most pupils as a career. However after chatting with the IAS scientists a few pupils have reconsidered. Also it is great to see pupils who can be very quiet in class chatting happily on line with the scientists.

Students have been incredibly engaged by the fact that actual scientists give up their time to talk to them, the questions have been brilliant and they have really enjoyed finding out about science going on 'out there'. They have developed communication skills and also a higher level of independence.

Have you noticed any greater interest or achievement in science as a result of IAS?

No.

I can not link achievement to the exercise but I can link enthusiasm and a greater knowledge of science research to the project.

have not been completing it long enough to say.

Certainly meets the aim of "scientists are real people"; students love to find out someone with a top job as a scientist was not necessarily always really good at school. Again the type of student we have shun the normal school curriculum and often feel like failures. So we can show them that even if you muck up at school, its what you learn form the experience and what you do after that matters.

The pupils have definitely developed in confidence and with their communication skills. The pupils at our school struggle with communicating with adults and professionals and would never have thought that they could have spoken to a scientist or they perceived scientists to have the familiar stereotype of being "geeky", but this perception has definitely changed.

As far as achievement is concerned this is not obvious as a result of IAS; however the incorporation of IAS and other practices as an ILT focused teaching tool in science has had an impact on overall achievement.

There is no evidence that results have been impacted as a result. However students are asking more in depth questions and some have said that they are considering science related careers as a result.

We have always had a strong interest in science here. This may be because we do not have the "science is for boys" effect in our school, obviously! Our science results have increased recently but I am more inclined to attribute this to the change to IGCSE, feeding through to improved A level results. I don't think IAS has directly impacted on examination results, as I said above, it is perhaps not so linked to our curriculum as to others. Where it has helped is in an increased awareness of science and scientists.

The 3 events I have signed up to (June 10, Jan 11 and June 11) have nearly always been with KS3 so the data hasn't been analysed yet. however if not attainment wise i am sure the pupils will get more from it from speaking to the Scientists (which of course cannot be measured as such).

The students were so enthused they have asked several times to repeat it. Some have carried on

reading about the Brain and Stem cell areas of research. In terms of results we have not had any yet which will reflect the IAS involvement.

There has been a greater interest in careers in science.

Starting to with some students.

IAS helps to motivate the students. Particularly those students who have been on a applied pathway and are perhaps not as able, they valued the experience and used it to complete assessed work towards their GCSE.

A definite increase in the interest in science - some of my pupils commented that they did not realise that there were so many different types of science jobs available. It is hard to say for definite about greater achievement in science.

For the class I took earlier in the yea I felt that the interest for linking classroom science to real life situations has really increased, with this level of engagement you can only hope that an increased level of achievement follows.

Is there any evidence that science results have increased in the last few years (and obviously this will be down to a number of strategies) do you feel IAS helped and if so in what way? (not all asked)

N/A yet.

As a stand alone project, no I can not make this link but as part of a multi-faceted approach then yes it has helped.

Too early to say, only took part this year.

Not able to comment.

I would say the interest has definitely increased, but not to sure about the exam results, I think for this you would have to look at the bigger picture and not just be reliant on IAS, although IAS has definitely given the pupils the skills to help them on their way.

This doesn't have a direct impact for our college course as the students are not aware that they will be partaking in this activity from the offset or as an advertisement for the course.

Possibly, although we have just changed our option structure and included an open ended practical competition where students design there own experiments. Too many variables to be sure if it's has an impact. Students were very keen to get on with the live chat and discussed this outside of lesson time.

Probably not! All our students take science at GCSE, the choice between dual award or triple science usually being determined by what other subjects girls would like to take. At A level we have always had a good take-up of all three sciences. The effect would not be seen yet anyway, as the first group to do IAS are now in year 11. Ask again next year!

We have seen an uptake of numbers of pupils picking triple science however I don't feel this is purely down to IAS,

Yes- much bigger cohort have taken up A Level. Unsure. I do not feel that it has contributed to the overall achievement of the students although the students have all enjoyed it.
Do you feel that it has helped improve numbers of students taking Science either at GCSE or A' level?
N/A yet. Just free internet activities or enquiries found on internet. Too early to say, only took part this year and with year 9. I would say the interest has definitely increased, but not to sure about the exam results, I think for this you would have to look at the bigger picture and not just be reliant on IAS, although IAS has definitely given the pupils the skills to help them on their way. Promoted post 16 study of Science and where GCSE Science can lead. There has been a greater uptake for triple science amongst my group that took part in IAS last year, this is mainly due to a rekindled interest in the way in which science impacts society. We are still in a selective education system in Bucks so do not have large numbers of A level scientists in our school. We book in outside talks now and again but nothing on the scale of IAS. We use Somerset local waste partnership that has links to the school - they were free but like many other similar things funding for them has now gone. Science fair- they get to develop their own research ideas and present them to their peers- they very much enjoy this. I feel that it can only help, I have used for the last 2 years for a top set year 8 now and they will go onto to triple science next year. Unsure yet, maybe in years to come. Again this is difficult to assess. Although I do have a fairly large number of pupils studying chemistry in S5/6 this year. Not applicable, we have more students opting for separate sciences this year but cannot definitively say it is related to IAS.
What other informal activities that you book in for your science students do you particularly value and why? Are these free or do they have a charge?
Talks by those in industry (costs a bottle of wine) Explorer Dome. (costs quite a lot). I use the outreach projects offered by the Physics department at the University of Kent. They are valuable to broaden student's minds on science and get them meeting "real" scientists. Just free internet activities or enquiries found on internet.

with reductions in school budgets and loss of the science specialism funding booking scientific activities that cost will be less likely to occur.

In the past we have booked for:

year 7 - snakes alive - a reptile talk and hands on experience - charged

year 9 - forensic day - charged, this goes down very well

Year 11 - animal behaviour expert - charged - how to train animals

year 12+13 - assorted outside speakers - usually focused -

year 13 - PCR practical session - great as hands on molecular biology experience - came from science specialism

year 7+12 - a giant inflatable cell, so you experience being inside a cell - charged - this is great for yr 7 just learning about cells and year 12 who are doing the ultra structure of the cell as part of AS biology

year 8 - CHAOS from Cambridge university - charged

year 11/12 - UK Japan young scientist workshop - week long science projects at Cambridge university involving other UK and Japanese students - charged - great for science and cultural exchange

Year 10 - rocket launching - charged

year 10 - Salters chemistry camps - charged

The best activities are hands on ones where they are doing the investigating, it can be an extension of what they are studying or completely off the curriculum. Anything that opens up the students eyes to science and its application is great.

Free visit to MMU museum debates. Again meeting scientists and the work that they do, schools careers advisers don't even know these jobs exist!

I am always trying to book freebies or bargain trips for pupils and my science club. The pupils love to get out of the classroom and a hands on approach. I have taken numerous trips to Manchester Museum to free science workshops and also to science fairs at Manchester University. I feel that the pupils gain confidence and communication skills again from these trips as they interact with other pupils from different schools and professionals. They also get the time dedicated to them which they may not necessarily get in class.

One of the main resources we utilise our visits and guest speakers from specific science backgrounds and industries. These are mainly free; however some visits we do have to pay admission fees for or transportation costs. These are particularly valuable as they give students a chance to make contacts within the relevant industry and also see the workings of a scientific industrial process.

Our students take part in a range of other activities, speakers may come in to class, they take part in study days both in school and at the Natural History Museum in Oxford, the Year 7 favourite is Dinosaur Day. I have had the bug lady come in and bring some of her animals. Most of these activities cost very little, except for the transportation. We would not be able to take part in both

weeks if there was much of a charge.

We've just entered some of the students project work for CREST awards- although the £4 fee is putting some students off. The projects are just as beneficial with out applying for the CREST award. The school will not cover the cost of the award. We also linked to a local football club to research energy saving technologies- this was free and also proved to be motivating for those involved.

We really enjoyed the Biology Challenge this year. http://www.biology-olympiad.org.uk/biology-challenge.

This is great for stretching bright pupils and allowing them to achieve. It does have a charge, but it's fairly nominal – about £25 for the whole school I think.

We also took part in this:

http://www.climateweek.com/challenge/

and will do so again if it's on next year, as the girls really enjoyed it. This was a free activity.

n/a.

I use the Utah Learn Genetics which is free throughout KS3-5, it is brilliant.

Master class talks from local university, very whiz bang and inspire students to think about reactions around them. Visits to local workplaces and educational institutions, sometimes to under take observations others have been to complete practical work. Also national competitions can be very motivating and provide an opportunity for those interested to excel showing their Science knowledge. All but the competitions cost money.

We have booked activities through Glasgow University and SET. These include Science Ambassadors and science shows such as Zoombie Science. These activities are free of charge.

There have been a couple of questionnaires and we have had some external speakers/demo's and yes they have all been free.

We organise a number of visits for our students throughout the year most of which they have to pay for. However during NSEW we always have speakers in school and we do not pay for these.

Would you feel that the school would pay a similar amount for IAS?

If we paid for this we would not be able to pay for other experiences and would have to choose.

The science department has a tight budget and it would be unlikely that this would be something that funding would be spent on.

n/a.

With reductions in school budgets and loss of the science specialism funding booking scientific activities that cost will be less likely to occur. I suspect most schools are in the same position with about a 20% reduction in funding, not great times!

I have my own budget so I would decide.

Our school has a large number of free school meals and the science department in particular is quite poorly funded, but I think IAS being free is a brilliant scheme for our pupils and pupils from other areas similar to ours in which their background may be quite deprived as they would never get the chance to speak to professionals otherwise.

I think that the college would pay a reasonable fee for IAS; however the later stage (June event) was too late in the year for our college to take part as all our students had already completed for the year and therefore we felt that it was geared more towards schools and not colleges.

Our students take part in a range of other activities, speakers may come in to class, they take part in study days both in school and at the Natural History Museum in Oxford, the Year 7 favourite is Dinosaur Day. I have had the bug lady come in and bring some of her animals. Most of these activities cost very little, except for the transportation. We would not be able to take part in both weeks if there was much of a charge.

I'm afraid they probably wouldn't, it has been made clear that money is tight. I could bid for a donation from the school parent & teacher fund.

They might. To be honest the main restriction on the activities that we can fit in extra-curricular wise is time – I have not signed up for the June IAS because we are currently in the midst of school exam week, with not long until the end of term, and it just doesn't fit. If you charged for IAS I would have to ask my head of department to fund it from our budget, but if it was a small charge I don't expect that would be a problem.

Yes, I think the school could pay for IAS. However it will depend on various factors - cost, length of the event (it would be nice to have a extra week or so to ask questions (not the chat side) - this event has been better for that), the scientists involved as well.

Overall I have really enjoyed taking part each time, I think the events are great and the pupils always enjoy them.

The fair costs £450 in total to run, if I could put everyone in one year group through the program for the same cost it would be good value for money

I hope you don't start charging for IAS, but it it's a great resource and helps to summarise what they students have learnt and to ask any burning questions to real scientists as well as showing the pupils what careers are available.

N/A, I wouldn't push it if it were not free...the bit which is best is talking to the scientists and we found that we don't get enough slots, I would like to have 2 per week with each class.

I feel we would pay an amount to participate again, though it would depend on the amount as budgets are being squeezed and it may become a decision whether to participate in IAS or undertake one of the above activities rather than enhancing student experience by being able to offer both.

Due to severe budgetary constraints imposed on schools these days it is unlikely that our school would be in a position to pay for any of these activities. This year we have had no trips arranged to the Glasgow Science Centre solely due to the costs involved in such trips.

With the current education 'cuts' etc it is likely we could afford a small charge but not much, it would be a shame to lose this experience. I do not feel in the current climate that the school would have sufficient resources to pay for IAS.

Feedback from teachers from Quantum Zone (sponsored by the Institute of Physics)

Schools: Davenant Foundation School and Queen Elizabeth's Grammar School.

How valuable has IAS been in your science teaching in terms of linking informal learning approaches to the National Curriculum, GCSE course work etc?
I used the IAS with a year 7 Science Club group and it was a great way of enthusing the students about science as a future. If I were to use it again I would use it at year 10/11 where the students are thinking about their future careers etc. It worked very well - I adjusted the topic I taught to Year 12 to cover fundamental particles and they used IAS as their main resource to research it. some very interesting questions were asked.
How valuable has IAS been in your science teaching in terms of developing skills and best practice for you and your colleagues?
I have discussed the IAS with my colleagues in the department and they have been very excited about the prospect of using it as an enrichment activity for students on changing their perception of scientists and perhaps even developing a project around it where they research a particular scientist/we put them In touch with contacts of our own to help them understand it. Quite valuable, although the 'ready made' scenario was easy to use and did not need much development.
How valuable has IAS been in your science teaching in terms of the development of your pupils?
It hasn't been that relevant yet. But I plan to incorporate at least one of the lessons on what a scientist does wit year 10 next year. It was very good for them to see the opportunities that exist in Physics research.
Have you noticed any greater interest or achievement in science as a result of IAS?
No because I only tried it with year 7. Not as yet - I've only seen the groups once since the event.
What other informal activities that you book in for your science students do you particularly value and why? Are these free or do they have a charge?
We have speakers come to the school occasionally to talk about science topics. We try get these free. We are looking to bring them to the GCSE Science Live events this year so they can hear a talk about science. We have gone on trip to CERN which was amazing in terms of exploration of subject matter with A Level Physics. We take them on trips to e.g. the local hospital - they are generally free apart from transport, and often that is done with the school minibus!
Would you feel that the school would pay a similar amount for IAS?
I don't think the science department here would pay for the service. The real draw of it was that it was free and we are totally strapped for cash with physical resources a key priority. In my department the IAS programme was just something I did as a teacher and there would be resistance if I were to suggest we all applied and did it with our classes as others are not as interested in this type of educational enrichment. IAS appears to me to be a project which individual teachers will use

with classes they have chosen specially as opposed to a department wide choice so paying for it will reduce the appeal completely. We do have funding available, but as with everything the priorities would have to be worked out. The timing of June is very good as it is just after funding is finalised!

Feedback from Primary School Teachers

Lyndhurst Primary School and Toftwood Primary School

How valuable has IAS been in your science teaching in terms of linking informal learning approaches to the National Curriculum.?
I ran this as an extension for our G+T children in years 5 and 6 so this may mean my responses will be different to those using it as a whole class, mixed ability teaching tool. The children were very well engaged with the project from the outset (I used a combination of your lessons 1 and 2 as our starting point). Using the materials, they were able to engage in detailed discussion in small groups and then as a whole class. They considered the "value" they would place on scientific enquiry in general and of a range of different areas of enquiry. They were also able to establish their own, individual criteria for assessment of the scientists in our zone and to think about how they would decide if these criteria were meet. (NC: En1 – 1a, 1b, 1c, 1e, 2a, 2b, 2e, 3a, 3b, 3c, 3d, 3f; Sc1 – 1a, 2a, 2b, 2c, 2f, 2g, 2h; PSHE – 1a, 1b, 1e, 2a, 2e, 2j).
How valuable has IAS been in your science teaching in terms of developing skills and best practice for you and your colleagues?
This is more difficult. We did not use the project for whole class teaching and I came to it with a science specialism (I do not lead science in my school but come from a research background). I think all of our staff could use the project in a modified/slimmed down form, particularly the live chat and would find it a great way to generate enthusiasm for science in their classes. Could you arrange zones using scientists working on subjects related to those studied in particular year groups (e.g. rocks and soils zone, sound zone, conductors zone)?
How valuable has IAS been in your science teaching in terms of the development of your pupils?
The starting aims were: a) to facilitate independent research/enquiry into new scientific concepts and vocabulary, b) to make children aware of the wide range of scientific work being followed in this country, c) to undermine misconceptions about who scientists are and what they do and thereby to show children the possibilities of a career in science. These aims, and much more, were met for our pupils.
Have you noticed any greater interest or achievement in science as a result of IAS?
As yet, it is too soon to be able to say but I would predict that they will be much more open to new scientific ideas, will appreciate the relevance of understanding new areas and will be able to place these in a broader scientific background.
Do you feel that this type of event is in its current form appropriate for primary school needs and thus should be promoted further in this sector?
As I mentioned above, I think it is great for G+T in Primary but for the majority, some adaptation (some suggestions above) would be useful. There are not a great number of science specialists in KS1 and 2!
What other informal activities that you book in for your science students do you particularly value and why? Are these free or do they have a charge?
At present, we do not have any other extension activities except those linked to our cross curricular

topic work (e.g. visits to "water" for habitat studies included, Planetarium brought to school on "Space Day") – funding would be an issue for something seen as specifically a science activity, the subject does not have much "pull".
Would you feel that the school would pay a similar amount for IAS?
Possibly, if adapted more for KS2 and shortened/offered at different times of the year to increase flexibility of planning.

Appendix 3: Interviews with teachers

Interview with two teachers from West Thames College – March 3011 – Space Zone with year 13

The colleague is new to IAS and has found it a useful tool, in particular the debating kits – drugs was particularly useful – the students enjoyed doing them and could easily see the benefits and disadvantages of drugs – it gets them to think about the impact . She would like more resources like this. She runs the tutorial sessions on citizenship (not science) and thus has to look at topics such as this.

The Year 13 students enjoyed IAS – it was exciting to speak to real scientist and encouraged them to read a lot more. The first hand experience was important. Those students already keen to be scientists found it exciting to see the sorts of things they could do. They came up with some really good questions. Some also logged in at other times outside lessons. One of the scientists was really pleased with the conversations with these students and promised to send them some space food so they could see what it was like. This type of activity also helps promote science through out the college – we have taken a few photos to help promote our department and the informal learning that we include in the courses except How Science works. Students came in their crowds to watch the pupils in their activities and they rose to the challenge.

The girls are the other group were not so interested – but they took a focus in their questions to ask about non science things and enjoyed bonding with the scientists. It was good that there were some female scientists – gives them strong role models – they even answered about how they managed to look after their nails etc! The lads had technical questions. There may well be some follow up activities and a trip to oxford if all goes well.

Staff were also pleased to see that the diversity issue had been tackled and that the scientists were much more representative of the community as a whole. IAS gives pupils something teachers can't – exposure to different people – so far their only experience of a scientist is their teacher! We don't really link to the curriculum – it is largely enrichment but we have a science week too where we do lots of other things too- sometimes in the foyer etc so others can see or join in.

IAS helps students engage and get involved. They come into themselves and teachers are pleasantly surprised how much they know eg about theoretical physics as all science studies here are applied. Some have taken time to read up about the topic while doing IAS. Other benefits include something to put on UCAS forms as it links to first hand experience and the students like the certificates. Making decisions about who to keep gives them a sense of power too. Follow up on what the scientists do with the prizes would be good. It is also good to have something to talk about at university interviews.

There has been no tangible improvement in grades – those that do well continue to do well – just builds enthusiasm and depth. A' levels have course work where they work independently.

IAS needs planning in carefully to make sure time to provide preparation. March is good timing for us.

Other activities include trips such as Chemistry in art, free things from the web, and real life applications such as toxicology. University of Leicester has a good recycling activity to make Plastic. BTEC students are used to using the laptops so they respond well to IAS approach. There is plenty of funding for extra activities – just coaches expensive. College would pay for IAS – no problem.

Improvement s- the students would like to see other schools in the area when doing the IAS week – so they can "compete with each other and link up perhaps. It would be good to see all students as a teacher – as not always aware of their sing in names. Worth moderators praising good questions, but remember that less able will ask more basic questions.

Interview with two teachers from Matthew Arnold School - June - Years 8 and 9 - Marine Zone June 2011

Both groups found the chat sessions very enthusing. Year 9 (mostly boys –set 2) have finished the curriculum and so good to have something interesting to do. Year 8 (top set) are enthusiastic about science and put lots of effort into projects. This term they set up their projects themselves.

IAS is good for those teachers with an appropriate style of teaching – doesn't suit all so not all staff here would want to do it. For pupils it means they can widen their ideas about jobs in science as they assume a rather narrow range are available – so learn it is not just people in a lab! It opens their mind to other possibilities. They are now certainly more enthusiastic about science and have been talking a lot more about it. They showed their interest in the questions they asked and were interested in each others'. Staff encouraged them to think bout questions without using Google. Scientists were able to point them to other sources for further information which was great – Youtube etc and the students used this information to ask further questions. The marine zone was great with really good scientists – a bit more focus than the themed zone. The students did look at other zones and are keen to do it again. – They did some at home and were keen to go deeper into specific subjects.

Teacher's benefits are that it is nice at this time of year – book more classes would be good.

Other science activities we do include our partnership with Royal Holloway University – which is free – we get to do allsorts of lovely things with them – the G&T did Lego robots and in our science week they had scientist coming in – they get to go to the university too to do experiments. Students also go there for taster days – SENET

Otherwise we paid £500 for a dome planetarium which was expensive for us and £300 for a science circus. Companies also send in people to do free sessions.

We do have other funds eg from G&T and for curriculum extra afternoons on Wednesdays so can book things with that money. But otherwise our budgets are small. If we had to pay a small fee that would be ok but would need good value –eg more chats per class – we only managed to get one this time. The pupils certainly feel valued as they scientist have given up their time for them.

Appendix 4: Student feedback from Personal Meaning Mapping key words exercise

Key positive attitude words in green and key negative attitudinal words in red – found in the first 100 most used words by students

Term	Original	Added	Removed	Current
biology	132	35	11	163
experiments	132	30	14	155
chemistry	123	33	14	150
physics	100	29	10	123
chemicals	98	14	6	110
interesting	99	15	6	107
happy	87	13	11	87
fun	70	18	8	81
excited	81	8	10	77
science	57	18	3	73
interested	69	10	9	72
bunsen burner	54	14	10	68
space	53	13	10	63
periodic table	40	18	8	61
elements	44	5	10	58
explosions	50	11	3	57
test tubes	45	11	10	52
liquid	33	14	5	47
solid	34	14	7	46
animals	34	11	3	45
exciting	36	9	3	44
curious	38	6	1	43
clever	31	12	4	41
boring	41	7	4	40
scientist	25	16	2	40
electricity	28	12	4	39
gas	26	12	5	39
photosynthesis	30	7	0	37
planets	29	8	0	37
acid	28	6	5	36
confused	32	6	4	35
smart	29	13	5	35
plants	21	10	2	34
practical	22	10	3	34
atoms	28	6	1	33
energy	20	10	5	33
evolution	25	10	0	33
bored	42	5	13	32
earth	26	5	4	32
solar system	24	6	4	32
gravity	25	7	1	31
acids	24	7	0	30
compounds	19	5	5	30
cool	29	6	5	30
goggles	22	8	2	28
intelligent	26	6	2	28
reproduction	20	9	3	28
alkali	25	4	2	26

amazed	24	4	2	26
cells	16	9	2	26
confusing	23	4	1	26
lab	20	7	2	24
investigation	14	10	1	23
lab coats	22	2	2	23
carbon dioxide	13	6	3	22
inventions	13	9	0	22
particles	14	6	3	22
amazing	14	7	1	21
discovery	10	8	6	21
molecules	16	5	1	21
reactions	17	4	2	21
universe	18	5	1	21
Einstein	15	7	2	20
moon	13	6	4	20
oxygen	12	7	4	20
respiration	13	6	2	20
brain	8	8	4	19
challenging	17	3	3	19
disease	11	9	2	19
sun	15	7	2	19
weird	14	6	1	19
beakers	12	5	2	18
equations	16	3	1	18
useful	14	4	0	18
awesome	14	4	2	17
intrigued	17	1	1	17
bacteria	9	5	2	16
big bang	12	4	0	16
blood	12	5	1	16
chemical	14	5	0	16
data	14	3	1	16
enjoyable	14	3	1	16
environment	13	4	1	16
fire	13	5	2	16
forces	14	2	0	16
global warming	10	4	2	16
human body	11	6	0	16
laboratory	15	2	1	16
light	12	5	4	16
school	15	2	1	16
tests	13	4	0	16
theory	11	3	2	16
brainy	12	3	0	15
Darwin	0	3	2	15
enthusiastic	13	3	1	15
experimental	14	1	0	15
gases	13	4	0	15
rocks	10	5	0	15

Appendix 5: Scientist feedback

Informal discussion with scientists at the celebration event on June 30th 2011: Discussion with 4 young scientists in the process of postgraduate research

They were from a number of different zones including Energy Generation and Microbiology

All enjoyed the event and stated the following outcomes:

- Ability to communicate with students
- Ability to talk about their work in everyday language
- A greater sense of enthusiasm
- Satisfaction in supporting students in understanding but also inspiring them in science
- "Refreshing" – the pupils have a strong idealism and are optimism in making a different and better society
- Reflective

Other feedback

- They were impressed that some took time out of school to ask questions, research etc
- They enjoyed the chats for the more personal links but the off line questions offered opportunity for more detailed answers
- Sometimes questions are not linked to the zone but are rather general. Not a problem but there might be better scientists in another zone who might be better at answering it!
- Generally they had support from their work teams although some older senior members don't always see the worth of this public side of their work – which they and others see as central.
- Some lovely ideas on how the winner is going to spend her money!
- Lots of questions on working with animals and also religion (*perhaps something for debating kits?* KP)
- Good to hear from a different and wide range of students and other scientists
- Wanted to win!
- Widens access
- An "*imaginative use of web communication in science*"
- Interesting way of engaging with students
- Change attitudes towards science but also some of the institutions

Feedback from Scientist email interview – based in Healthy Ageing zone

How did you find the experience of being part of I'm a Scientist?
It was fun, but also very challenging - especially the live chats. Made me think about science from different perspectives. And I was surprised by the level of knowledge and insight displayed by some of the questions - hard to believe sometimes that I was talking to children.
Did it meet your expectations?
Mostly. From looking through the archived questions on the site, I had a rough idea of what to

expect.
Were there any issues? Did your colleagues support you?
I know this was probably a consequence of how the Healthy Ageing Zone was funded, but it was a little intimidating to be the only one in the group not based at Newcastle. Might be worth trying to encourage wider participation if this is going to happen again in subsequent years. Time was something of an issue. I'm not sure if there was an advantage to be the first person to answer a particular question, but with questions appearing seemingly at random, it made it hard to schedule a specific time. If questions were released by the mods at set times each day, that might have made this a bit easier. Colleagues were OK. My boss encourages participation in public engagement activities, and has been supportive of my colleagues who have participated previously, and the knowledge transfer officer in our department was also rather keen.
What made you decide to participate?
I've been interested in public engagement with science for a while now, and I was keen to try and engage with schoolchildren. I don't think I'd ever met a "real" scientist until I went to University, and I would have loved to have such an opportunity when I was at school, so was keen to try and make the best of it. Also, some of my colleagues had participated in previous years, and said they'd enjoyed the experience.
What do you feel you gained from the experience?
I've gained a greater awareness that I need to take the level of knowledge of my audience into account when talking about science. Or anything really.
Would you do it again? Would you recommend colleagues participated?
Maybe. It did take up a lot more time than I thought it would, but now I know better what to expect. A couple of my colleagues were following my progress and have already registered for next year!

Appendix 6: Stakeholder feedback

Interviews were undertaken by phone and email with representatives of:

- Institute of Physics
- RCUK
- Beacon for Wales

How do you feel it has gone (from your point of view)?
It sounded as though it went well – I have heard from some of the scientists and I managed to view some of the chats – not as many as I would have liked but I had limited time available. One of our key aims is providing an opportunity for our researchers to undertake public engagement, as well as inspiring young people to follow research careers, study beyond 16 and become more informed citizens Yes it seems to be effective – feedback from teachers suggests it has been very good – although we haven't done any formal evaluation. We have also had some independent A' level students using it – and they have enjoyed it too. I think that the scheme as a whole has been good for getting scientists interacting with young people in a manner that they cannot usually access. The downside (for me) is that I was not able to get more Welsh academics to take part despite quite a bit of cajoling and promotion.
Have there been any issues?
Some scientists found it a bigger commitment than they originally thought. The admin has largely been smooth on both sides – more planning time would have been useful =- especially as this is our first year of doing this. However, it has run very well, all things considered. None that I have been aware of.
Do you feel the scientists involved got a lot out of it - and if so what in particular?
Part of their work to engage with public, but also develop their skills and their communication skills I think that they really enjoyed the range of questions that they received from the pupils and were surprised at the level of interest in the scientists' (sometimes) narrow areas of interest. These scientists also had to work quite hard to show the relevance of their work, but this is a useful activity for all researchers to be able to do.
What benefits have there been for your institution?
It has fulfilled our aim to engage with society – and this approach means that we reach more remote schools and the programme is nicely student lead. They were interested in science, research, the process etc Putting physicists in contact with school students is an important part of the Institute of Physics' work – and online engagement is an important strand to this. IAS has proved to be a very useful vehicle and has allowed our members to get involved without geographical constraints. Linking scientists to the scheme meets the aims of the Beacon for Wales in terms of getting more

people involved in public engagement activities and in terms of being seen as a broker between schemes and Welsh academics.

For the institutions that the scientists belong to, I think that the benefits are quite peripheral as they are limited to a couple of individuals and there has not been the sort of local or even national, coverage that universities value. The institutional benefits are related to the increased ability of scientists to explain their work, a better understanding of what (and how) young people in schools are taught about science which can help with undergraduate teaching and, possibly, the links that some academics may have made with scientists in other institutions which may have a longer term collaborative benefit.

Has it been value for money?

Yes – currently looking at out strategy and our future spending. We are interested in doing this again but we need to wait for the strategy review. Is very good value as it is an online approach – and thus expensive – and complements our programme of researchers into school. You need both approaches as our other programmes develop longer lasting relationships. This is though a good new way to engage the public.

Yes, although this might depend on the scale we undertake next year – this initial testing phase for us has gone very well. We can offer this to our network of schools – some of whom do not have specialist physics teachers.

One of our key aims is to engage students that would not normally consider taking physics at A-level and to also show them that physicists are normal people. In particular we want to target school without specialist physics teachers – in such a school IAS may be the first opportunity that the pupils get to speak to physics graduates before they make that all important decision of what to study post-16.

I don't think that I can comment on that. I don't know the overall cost of the project to talk about the value for money for the whole, and I was not directly involved in the actual sessions so can't talk about this from the perspective of the time commitment of the individuals.

Do you feel you were involved enough?

We agreed an approach with Gallomanor – who have been very accommodating – we were a bit late doing all this so it was slightly rushed – not all researchers stated on their form which funding strategy they were funded by and so we need to adapt our form for future use. I think that a longer planning stage would be better next term. The training was good – optional in the end - so all in all brilliant but a bit short notice.

Yes

How much do you need to invest in staff time to make it more worthwhile?

We were very involved – logged in and observed. Gallomanor were very accommodating. I wouldn't need more time – I saw the questions etc.

The involvement level is about right. After seeing it IAS in operation for the first time, next year we intend to get more involved and assist the winner in their outreach activities and support them to in

develop a successful project with the winning money. Probably just need more time to promote the scheme over a longer period of time to get more academics offering to participate.
Would you be involved again?
RCUK are currently looking at their future strategy for how best to continue to support engagement between young people and researchers, but it is likely that RCUK or the individual Research Councils will be involved in the scheme in some way in the future Yes we already plan to do it again next year. Yes.
Do you feel if fulfills the remit to engage society more?
A Colleague went to the event on 30th June and saw scientist talk about what they want to do with the winnings – lost of idea on how to spend on public engagement – if they need more help them could be directed towards the National Co-coordinating centre for public engagement. – www.publicengagement.ac.uk. Yes see above. This scheme contributes to this remit. Whilst we are not expecting all researcher to engage with all sections of society, we are working to get universities as a whole to engage with the full range of publics. IAS fits as one element in the overall work for universities to be doing.