



Pilot Evaluation – Executive Summary

I'm a Scientist USA - May 2015

Tristan MacLean

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I'm a Scientist, USA

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Student

*"I am so glad I am actually talking to real scientists! Thanks for the great experience!" - **Hamilton school student***

Scientist

*"I wanted to thank you so much for the opportunity to interact with so many amazing schools and students! I never expected to make it as far as I did, but I am very grateful. This was a really transformative experience for me." - **Lindsay Hunter, Rising Star Expedition***

Teacher

*"Every time a scientist would answer a question one of them would turn to me and raise their hand or yell "They answered my question!" and they've just never experienced something like that before in a traditional classroom setting."- **Lesli Horowitz, Kearney High School***

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Evaluation conducted by Tristan MacLean.

Summary

I'm a Scientist is an award-winning event, originating in the UK. It is in the form of an American Idol style competition between scientists, where school students are the judges. *I'm a Scientist* creates opportunities for scientists to answer questions from students via the internet, opening dialogue, while developing skills and understanding of the scientific process. It also gives students an idea of what it is like to be a scientist and the types of careers available.

Key figures for 2015

- **One event – 11th to 22nd May**
- **One zone – General science**
- **13 schools**
- **19,699 visits to the site**
- **262 students took part**
- **2,120 scientist profile views**
- **402 questions asked**

Evaluation data was collected from scientists, teachers and students. Web analytics and site usage statistics are combined with questionnaires, interviews, school performance data and classroom observation. **Data suggested that the pilot event was very successful, exceeding teachers' expectations and inspiring students.**

More detailed analysis of the findings are available in the evaluation report.

It shows that:

- **Scientists** became more confident in communicating their science and developed techniques to provide informative yet short explanations. The excitement and interest of the students reaffirmed the importance of their work, re-invigorating and inspiring them. The opportunity to learn more about their own subject from a broader perspective revived their enthusiasm for their work and made them more knowledgeable about their subject.
- **Students** enjoyed the event and were far more interested in science jobs and careers. Students of all ages, abilities and backgrounds engaged well with the scientists and found the event to be a rewarding experience.
- **Teachers** were all very pleased with the experience their students had and the positive impressions the scientists made. They developed a better understanding of their students' interests and 86% gained new ideas for teaching. Given the opportunity, they would all enroll classes in future events.
- The logistical and technical delivery of the event went very smoothly and was praised by teachers and scientists.

1. Background

I'm a Scientist is an innovative approach to STEM education and public engagement that cleverly utilizes familiar and commonplace browser software to create inspiring and exciting lessons that are capable of reducing equity gaps. The event overcomes geographical barriers and provides access to expertise and learning opportunities for all students that enables them to personalize their learning. *I'm a Scientist* provides a platform for scientists to share their knowledge and expertise while learning about public attitudes to their work and further developing their communication skills.

I'm a Scientist events consist of three main student focused activities; ASK, CHAT and VOTE. In the ASK section students are able to submit questions to the competing scientists whenever they like. CHAT involves 30 minute live chat sessions with the scientists and groups, or classes, of students that are moderated. Students choose the most deserving scientist to win the competition by casting votes in VOTE. Students get a new opportunity to vote with each round of eliminations.

I'm a Scientist has been running in the UK since 2008 where it is funded by the Wellcome Trust and a number of other research organizations and learned societies. Evaluations are undertaken of each event and large scale evaluations of the programme have been undertaken a number of times.

2. Event and evaluation objectives

The aim of *I'm a Scientist USA* is to enhance science education and public engagement by promoting *more two-way dialogue between scientists and the public*. The event and evaluation objectives were developed based on this.

The pilot objectives were:

- To run the event pilot (website, competition and supporting materials).
- To run a general "zone" featuring competition of five scientists talking to 20 classes of students. This equates to approximately 400 students.
- To evaluate the project at the beginning and the end to see if the desired outcomes have been achieved.
- To collect evidence of the impact of *I'm a Scientist USA* that can be used to support funding applications for future events.

Formative evaluation objectives for delivery and the impact on scientists, students and teachers were developed from the pilot aim and objectives:

- What worked well and not so well?
- What aspects of the program administration and website could be improved?
- The impact on students' education and their attitudes to science.
- The value to scientists and their organizations.
- The benefits to teachers and any challenges.

3. Methodology

The information collected in the evaluation included both quantitative and qualitative data. The particularly rich degree of quantitative data available through surveys and online activity is able to more conclusively confirm the findings from qualitative data and determine the degree of impact achieved. The availability of this data is one of the defining strengths of this program over other STEM outreach and engagement initiatives.

Overview of evaluation approaches:

- Summary data relating to the event was collated e.g. geographical location of schools.
- Analysis of web traffic and online event activity.
- Live chat interaction recording and analysis.
- Pre and post-event questionnaires for scientists, teachers and students.
- Classroom observation.
- Interviews of teachers by Skype and in-person.
- Interviews of scientists, in-person and by Skype or Google Hangout.
- Case studies of scientists and schools.
- Collation of general feedback comments.

4. Scientists

We received thirty applications to participate in the event. Five scientists were selected to take part based on a) the one sentence description of their work and b) our desire to formulate a diverse panel of scientists working in industry, academia and non-governmental organisations across a range of scientific fields to engage the students.

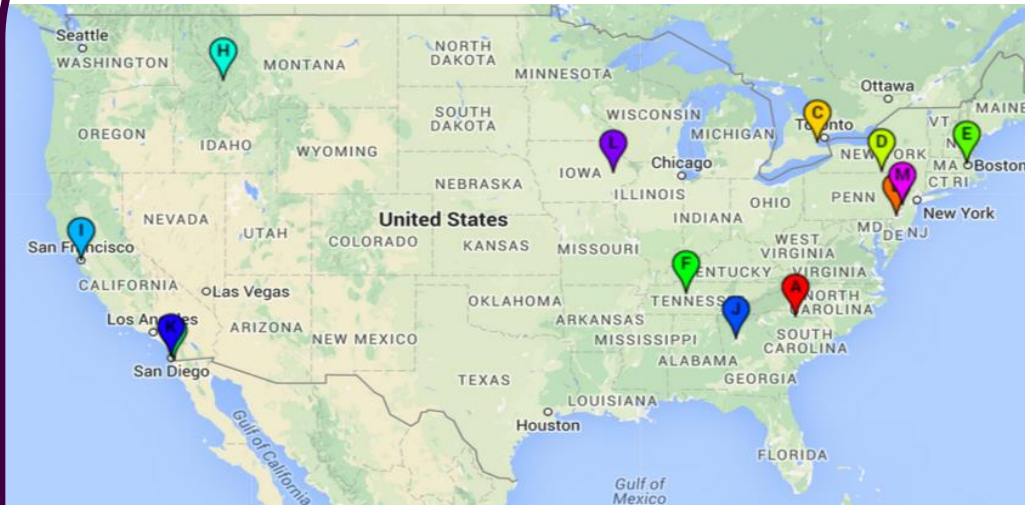


The final five scientists chosen to participate included three academic scientists, one working in industry and one working for a non-governmental organization. They were located in New York State, California, Minnesota, Michigan and South Africa. Their areas of expertise included entomology, archaeology, paleoanthropology, microbiology, food science, ecology, evolutionary biology, maths, computer science and neuroscience. Ideally scientists working in the chemical or physical sciences would have been included, however, there was a significant majority of applicants with biological science specialisations and the final five applicants chosen was representative of the applications received. The scientists profiles and CVs can be accessed here <http://hydrogenm15.imascientist.us/scientists/>

5. Schools

Thirteen schools took part in the event. The schools ranged from Elementary schools to High schools. They included state schools, charter schools and private schools.

Location of participating schools



-  Saluda Trail Middle School, SC
-  High School of the Future, PA
-  Garth Webb Secondary, ON
-  Vestal middle school, NY
-  Acera School, MA
-  Dickson County High, TN
-  Hilltop High School, CA
-  Hamilton Middle School, MT
-  St Mary's School, CA
-  Kindezi School, GA
-  Kearny High School, CA
-  Indian Creek Elementary, IA
-  Robert Hunter Elementary, NJ

Schools were located both in the USA and Canada, across eleven different states or provinces. The schools are based in urban centres e.g. the School of the future in Philadelphia and rural communities e.g. Hamilton Middle School in Montana.

The smallest school has 99 students while the largest has over 2,000. Class sizes varied from over 30 students to classes of six to eight students.

The students taking part varied, from schools with indicators of very economically deprived student intakes to those with very few deprived students. Diverse ability levels and ethnicities were present amongst the schools and students taking part.

6. Results

Summary data

Number of zones – One (Hydrogen).

Number of teachers - 14 (with some working with a number of classes).

Number of schools - 13 schools registered, all schools took part and only 1 school did not engage in a live chat.

Geographical range of schools – 2 countries (USA and Canada), 11 states/provinces.

Number of classes - 18 classes registered to take part. Only one of the registered classes was unable to take part due to an exam clash.

Number of students - 262 students.

Student activity - 80% of student log-ins recorded activity in ASK, CHAT or VOTE.

Number of scientists – 30 scientists applied for 5 places. Five scientists completed their profiles, four scientists engaged in live chats and answered questions in ASK.

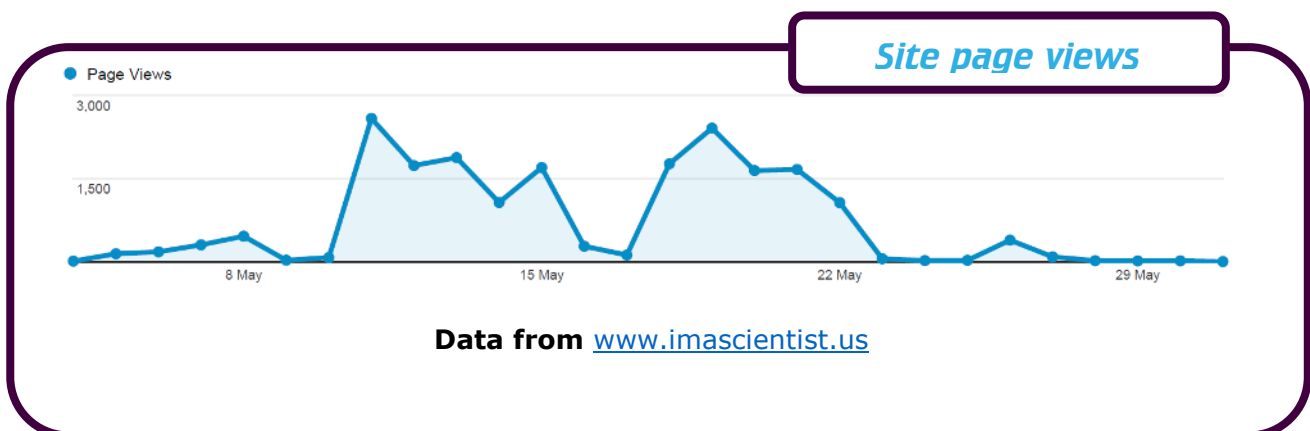
Number of live chats - 17 live chats in the Hydrogen Zone. Maximum number of live chats undertaken by a school = 3. All but one school took part in live chats.

Number of responses from scientists – 385 answers to 402 questions. The first and second placed scientists provided approximately 129 answers each.

The quantitative results are listed in more detail in the Zone report (<http://imascientist.us/zone-reports>)

Web traffic

The overall traffic to the website during May coincided closely with the live chat bookings (see below).



Profile page views



Data from www.imascientist.us/profile/

PAGE VIEWS	HYDROGEN ZONE
Total zone	19,699
ASK page	1,542
CHAT page	2,721
VOTE page	2,175
Scientist profiles	6,426

Summary of page views

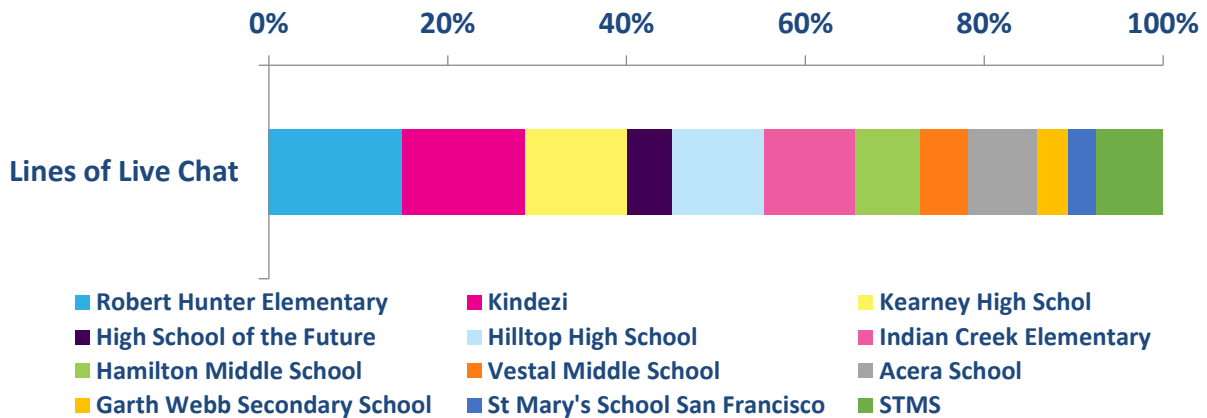
The ASK question which received the most page views was [What is love?](#) with 62 hits.

Scientist	Profile views	Position
K. Lindsay Hunter	482	2nd
Jeff Shi	470	Winner
Zoe Getman-Pickering	423	4th
Kenzi Clark	404	3rd
Avani Wildani	341	5th

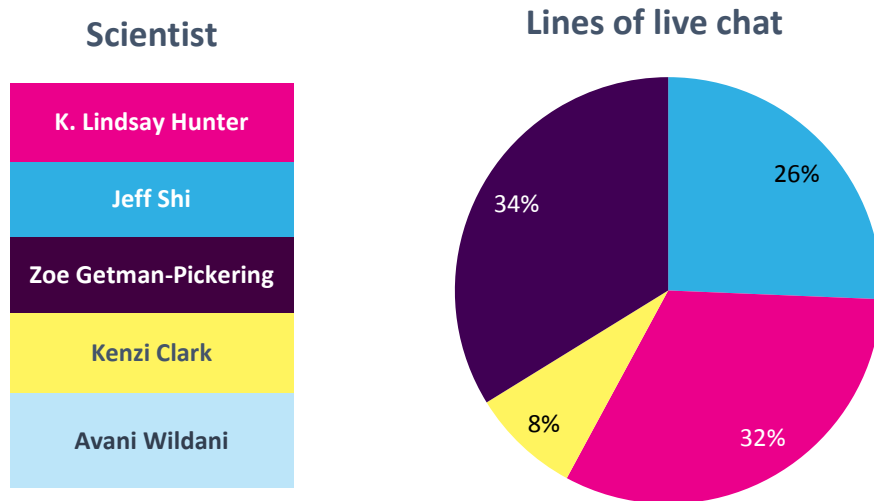
Live chat interactions

Keywords occurring in the chats were ranked by frequency. The data was presented in the [Hydrogen zone report](#). In addition to this, while live chats took place, snippets of conversation that reflected the interactions between the students and the scientists were copied to a text document.

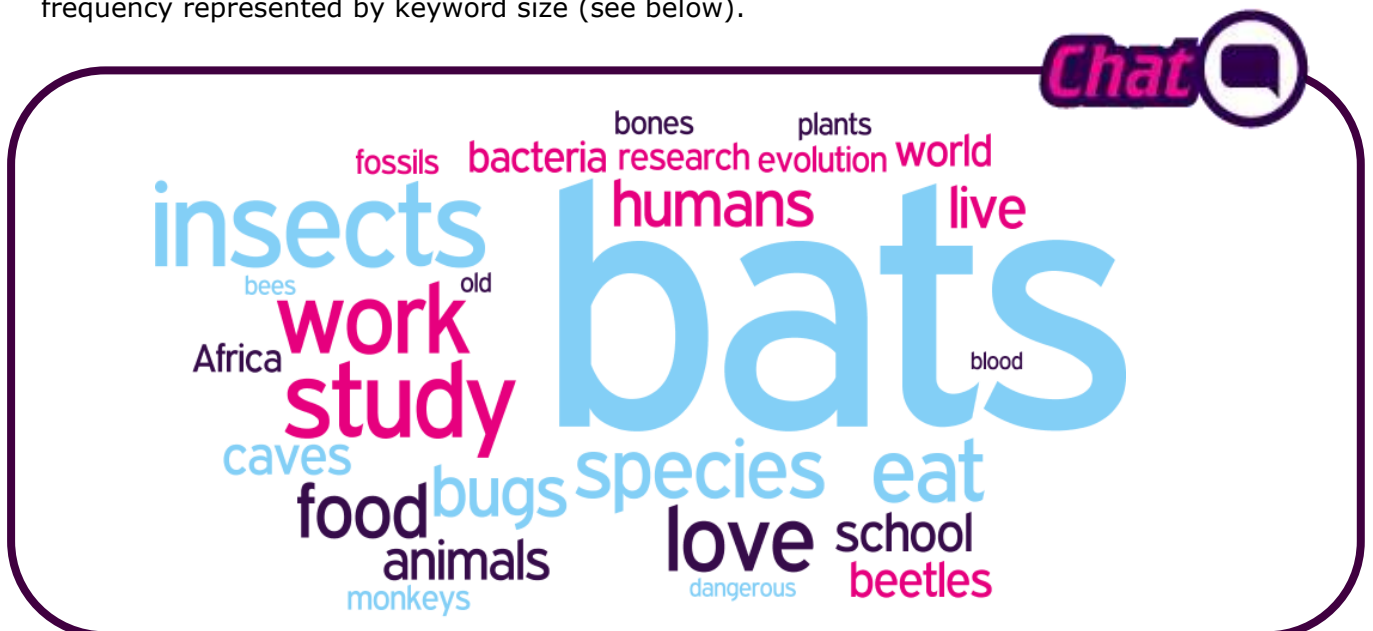
There were 3,324 lines of live chat with an average of 190 lines across 17 chat sessions. The contributions to live chats graphed by school are shown below.



The contributions of the scientists to the live chats are shown in the pie chart below.



The live chat archives were processed to remove non-keywords such as, 'that', 'for' etc. They were then analysed and displayed in a word cloud (www.wordle.net) with frequency represented by keyword size (see below).



Popular topics in the zone were bats, insects, caves and food – showing the students picked up on the research interests of the scientists. Lots of the students wanted to know about superheroes and batman due to Jeff’s research and profile description. During chats there were also lots of questions about caves, fossils evolution and sometimes eating insects. Chats predominantly featured biology and often topics overlapped, with Lindsay, Zoe, Kenzi and Jeff co-operating to answer the students’ questions.

Many students asked the scientists how they got interested in their subjects, what they liked at school and how they ended up doing the work that they do. Areas of potential controversy arose, such as animals being hurt in research, the ethics of dissection, evolution, GMOs and artificial ingredients in food, and the scientists responded excellently providing clear and well-reasoned explanations that were invariably well received.

Examples of good engagement during live chats were saved. A common question from students was why the scientists chose to have a career in science e.g.

"268hyda23 : why did you choose to become a scientist ?

Zoe : @268hyda23-I became a scientist because I love asking questions and learning interesting facts about nature. As a scientist I get paid to keep asking questions and discovering new things.

Lindsay : @268hyda23 I don't think anyone can really put a date on how long they've been a scientist since it's really all about a way of approaching the world. I've always been curious about the world and tried testing my observations."

School of the Future

Further examples of interactions between scientists and students are detailed in the full evaluation report.

Questionnaires

Response rates for the questionnaires ranged from 100% for the participating scientists (the 4 scientists who undertook live chats and answered questions) to 3.8% for the student post-event questionnaire.

Response rates are listed in the table below.

	Pre-event	Post-event
Scientist	100%	100%
Teacher	54%	54%
Student	80%	3.8%

The questionnaires and responses are detailed in the full evaluation report

Classroom observation and interviews

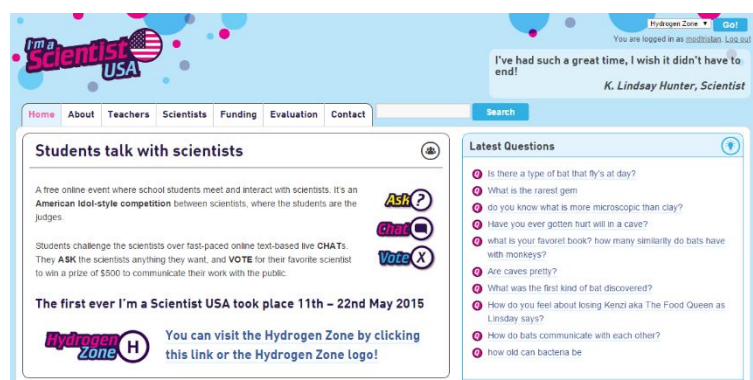
The classroom observation results are documented in the full evaluation report in case study 7.1 – Vestal Middle School. The approach adopted for the observation involved recording teacher instruction and events in the classroom including the reactions of the students along with more focused observations on one student chosen randomly at the beginning of the lesson. Interviews with three scientists and three teachers are also documented in case studies available in the full report.

7. Discussion

The pilot event was very successful based on the degree to which the website was fully functional, the number of schools and scientists who participated and the supporting materials that were developed alongside the successful communication and logistical planning of the event.

The website, zone and associated elements (sign-up, chat bookings, live chats etc) all worked well and required only very minor changes to the positioning and format of some content. Teachers reported using a variety of devices to access the site including tablets, laptops and desktop PCs on both Apple and

Microsoft operating systems. Some teachers did report problems having all their students log-in. In most cases the problems were quickly and easily identified and resolved. In those situations where students could not log-in they invariably paired with other students and were still able to engage well with the live chats.



We were able to choose scientists to take part who represented both genders and worked in a variety of different organizations; academic, non-governmental, industry, geographically spread out and at different stages in their careers. Their work covered a wide spectrum of topics, though they were all biologists. A substantial proportion of the applicants were biologists, and in order to include a wider range of science subjects, greater efforts to reach chemists, physicists, earth scientists and those from other disciplines will be required during any future recruitment efforts.

The schools who took part were from across the country and covered a large spectrum of size, age range, demographics, type of school and location. It would not have been possible to choose a more diverse spectrum of teachers and students than those who took part and this was fortuitously successful. The eighteen classes who signed up for the event was just short of the targeted 20 classes. The 262 students who took part were lower than projected due to smaller class sizes. Despite this there were still 385 answers to 260 approved questions in the ASK section and 80% of students were active in the zone which compares very well to the levels of engagement in *I'm a Scientist, Get me out of Here!* events.

The evaluation objectives have been met successfully with informative results and useful suggestions for improvements that can be made.

The pilot event was undertaken to assess the feasibility of moving forward with *I'm a Scientist* in the USA. Following the success of the pilot event efforts are focused on securing 501(c)3 status of the program and securing funding for future *I'm a Scientist USA* events.

Outcomes

The event went very well and there was a lot of excellent feedback from scientists, students and teachers.

"It was exceptionally well managed, as far as any sort of communication event could be and I was very impressed. You did an excellent job moderating and I think it all went off very well, very professional." – **Lindsay Hunter, Rising Star Expedition**

Responses from teachers indicated a significant impact on the students' attitudes to science and their awareness of scientific jobs and careers. The students were well informed through their participation judging by the number of questions that were answered. Based on observation of the live chats the students were inspired and excited by the scientists and had very positive opinions of scientists following their interactions.

The scientists all reported that their participation had a significant impact on them. Lindsay said the event was "transformative" and her organization placed a high value on her participation.

"I wanted to thank you so much for the opportunity to interact with so many amazing schools and students! I never expected to make it as far as I did, but I am very grateful. This was a really transformative experience for me." - **Lindsay Hunter, Rising Star Expedition**

Indicators of the value placed on the event by organizations included twitter activity by Lindsay's employer, Sepela field programs, in support of her involvement and a write up about Jeff's involvement in a news article on the University of Michigan website(www.lsa.umich.edu/ummz/News_Events/newsDetails.asp?ID=207).



SepelaFieldPrograms @SepelaPrograms · May 21

Follow Research Associate @Paleo_Bonegirl in @imascientistUS

K. Lindsay Hunter @Paleo_Bonegirl

Only two more votes and one more chat left before we have a winner for @imascientistUS! The suspense is killing me! #scicomm #STEMeducation

Providing an inspiring experience for the students was the paramount aim for teachers and they felt that the event achieved that for them. Challenges for *I'm a Scientist USA* identified during the event and evaluation included recruiting more schools and choosing a suitable time of year for the next event.

Teachers and scientists reported being very happy with the information they received and the overall communications, for instance:

"Your communication has been above and beyond! Thanks!" – **Marsha Graves, STMS, Rock Hill, South Carolina**

Each teacher received a pack containing a teacher guide, log in cards and debate pack. Teachers were very happy with the materials they received and 85.7% reported using the lesson plans or picking bits out of them for use in class. These resources overcome

one of the most time consuming aspect of teaching, preparation, and address one of the biggest obstacles to the adoption of educational technologies in the classroom.

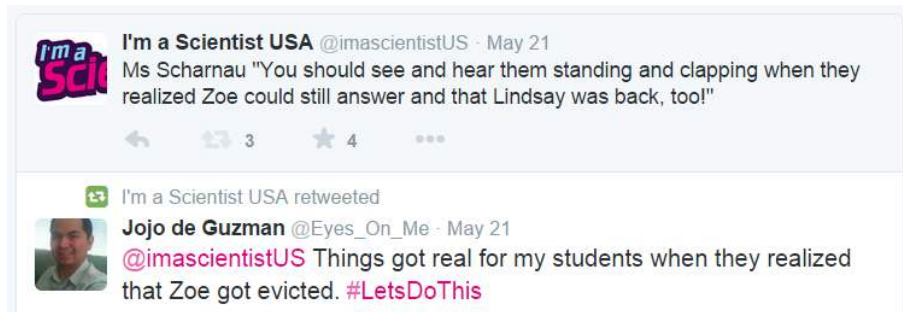
"Easy - It was easy to execute as a teacher. Instructions were mailed to me. I didn't have to do everything that was included in them. They were easy to follow. I didn't have to do very much prep at all, which is a great thing" – **Laura Smallbone, Garth Webb Secondary School**

With regard to the live chat, one teacher described it thus *"It was simple and very user friendly."* One scientist reported that it was difficult to begin with but quite easy when they got used to it. Some teachers did report problems finding the zone page, scientist profiles and the chat bookings. Overall the response is very positive but it will be worth considering options that will bring more fluidity and signposting to the site to improve the user experience.

Timing of the chats and the voting during the pilot was successful. There weren't any reports of classes or scientists missing live chats or scheduling errors due to time zone differences. Voting levels were an area of particular success in the Hydrogen zone with 396 votes cast versus a UK average of 270.

"The voting is a great idea and the kids really liked to end the session by voting and learning more about the scientists." - **Stephanie DeBiasio, Hamilton Middle School, Hamilton, Montana**

The importance of the voting to creating an experience with real consequences and giving the students involved a stake in the outcome was expressed very well in these tweets:



All of the scientist strongly agreed, or agreed that taking part had enabled them to report the 'Broader Impacts' of their work and increased their science communication profile. Scientists were re-energised with respect to their work:

"Being able to interact with students gives you a greater perspective on what you are trying to achieve." – **Lindsay Hunter, Rising Star Expedition**

The recruitment of scientists was slow to start with but very successful. Thirty scientists applied for the five available spaces. Scientists reported hearing about the event through twitter, word of mouth and institutional newsletters. Continuing to increase the reach of the twitter account [@ImascientistUS](https://twitter.com/ImascientistUS) and disseminating details of the program and upcoming events to institutional communications departments will help maintain fresh applications.

Barriers to recruitment would include the time required and possible perceptions of the program. *"How much of my time will it take?"* it is a recurring query and though

scientists reported that *"It didn't take too much of my time to prepare for"* this will remain a barrier to greater uptake.

The scientists' objectives for taking part were primarily to inspire and engage the students. Their feedback and comments after the event indicated that the event achieved that for them. Jeff himself stated that he had no idea what the event would entail when signing up, despite this in his winners blog post he stated:

"I cannot imagine a better use of my time the last two weeks than interacting with my fellow scientists and the amazing students that whole time." – **Jeff Shi**

The scientists placed a high importance on communicating science to the general public and found that *I'm a Scientist* enabled them to achieve this.

"One of the most important things in science is communicating what you learn to other people." – **Zoe Getman-Pickering**

All the scientists reported that they would take part in the event again. All the participants are already involved in, or have experience of, outreach activities and it is likely that they would continue to engage with the public.

There was clear evidence of impact on students and learning taking place. Students changed their attitudes towards scientists and science careers, and their overall enthusiasm to engage in their science lessons. This ability to reach even normally disinterested students was summed in the following feedback:

"Even the kids who I thought wouldn't care too much were some of the most eager! I am always looking for ways to engage those kids who don't see science as "fun" and I am glad that your lighthearted and enthralling answers inspired them! Keep up the GREAT work!!" – **Stephanie DeBiasio, Hamilton Middle School, Hamilton, Montana**

Teachers gained new ideas and perspectives for their future teaching practice as well as developing a greater awareness of their students' interests. Teachers found some of the features of the event particularly helpful, such as live chat moderation:

"I also like how there is a monitor. I could warn the kids to keep questions appropriate and if not they would be kicked out. They can really turn on the maturity if they know that this is an authentic experience." – **Stephanie DeBiasio, Hamilton Middle School, Hamilton, Montana**

The event was a huge hit with teachers and in many cases exceeded expectations:

"The chat went better than I expected! I was so impressed with how much the kids got into it and how fun and interesting the scientists were. The kids did NOT want to stop!" – **Stephanie DeBiasio, Hamilton Middle School, Hamilton, Montana**

All the teachers surveyed and interviewed said that *I'm a Scientist* would or did fit with their curriculum and given more time to prepare could be more fully integrated into their lesson planning and schemes of work.

Inspiration was one of the most common descriptors used by students and teachers.

"I enjoyed chatting with you because you responded quickly. I also enjoyed chatting with you because you inspired me to work with bats." – **Camille, Student**

The event is aimed at ages 13 and upwards and yet it was noticeable that some of the most engaged classes were in grades 4 and 5. Based on some of the live chats and classroom observation, schools from economically disadvantaged areas were particularly engaged with the event. The biggest impact on students was simply the ability to engage with real scientist. It was clear from live chat conversations and the ASK questions that students gained a much greater appreciation of the work of scientists and any existing stereotypes were dispelled. This was supported by teacher observations.

"They were asking a lot of good questions about science careers and school during and after. I would definitely do this again!! Thanks for letting us participate!!" - **Laura Smallbone, Teacher**

Students were also more informed about issues such as GMOs and climate change after the event.

Enhancements and recommendations

The following were some of the suggestions made by participants for changes to the event and recommendations arising from the evaluation. Implementing these changes is not essential but would enhance the user experience.

- Providing easier 'one-click' navigation in chats, to reply quickly to students, and in the ASK questions to reduce the time taken to answer questions and navigate to student profiles.
- Display the time on chat bookings in an AM/PM format rather than use a 24 hour clock.
- Providing teachers more explicit guidance on navigating and interacting with the website.
- Developing better systems for teachers to access saved chat transcripts.
- Provide video upload option on scientists' profiles.
- Have a reserve list of scientists available for zones.
- Provide teachers with an advance highlight of potential discussion and debating topics in the featured scientists' field of study.
- Provide future engagement opportunities with the same scientists so students can develop longer term relationships.

8. Conclusions

In conclusion the pilot event was a tremendous success and there are many benefits the program can provide to scientists, students and teachers in the USA. Further work will need to be carried out to determine the value stakeholders and funders place on the event and to establish sustainable funding to continue and expand the program to serve more schools across the country.