I'm a Scientist & I'm an Engineer Ireland 2017

Evaluation Report

Science Foundation Ireland

Gallomanor
creating community conversations

Introduction

I'm a Scientist (IAS, imascientist.ie) and *I'm an Engineer* (IAE, imanengineer.ie) are two projects following the same format. They're X-factor style competitions for scientists and engineers where students are the judges. Students talk online with scientists and engineers. They break down barriers and the students begin to see STEM and STEM careers as something for them.

Scientists and engineers create online profiles (e.g. Sarah Guerin's on IAS, or Dominic Doyle's on IAE).

School students across Ireland read the scientists' and engineers' profiles, ASK them questions, challenge them in fast-paced live text CHATs, and then VOTE for their favourite to win a prize of €500 to spend communicating STEM to the public.

The events are split into zones of 5 or 6 scientists or engineers, and around 350 students in each. Zones are either themed (e.g. Diagnosis, or Space) or general, where they are named for elements in IAS or SI units in IAE, with a broad range of scientists or engineers taking part (e.g. Fluorine).

IAS is a global event; having also run the UK, Vietnam, Spain, Kenya, the US, Australia, and Malaysia. IAE runs in Ireland and the UK.

Our key findings in 2017 were:

- **We have improved on engagement rates in IAS since previous years.** With more schools and students registering than the historic average (average of 12 schools and 384 students per zone), additionally the percentage of students actively participating in ASK, CHAT, VOTE, or leaving a comment is up to 90%. This has led to more questions being asked and answered than the historic averages. The percentage of active students in IAE however, has dropped to 80% with fewer questions in ASK, or lines of live CHAT.
- **We have been successful in using online engagement to reach students who are normally under-served by the sector.** In total, 1,111 students from target schools (DEIS, or in an SFI target county) actively participated in the events; 54% of the active participants.
- **Taking part improves attitudes of scientists and engineers to public engagement.** The experience made them more confident in communicating their work, and 96% of respondents felt that they'd like to take part in more public engagement.

- **Taking part leaves most students feeling more positive about working in a STEM career.** However, for a proportion of those initially not likely to consider a STEM career, the event confirms their decision.

Key figures

We ran seven zones:

- **IAE, February–March 2017**
  - Two themed zones (Health, and Space).
  - One themed zone for Primary Level students (Energy).
- **IAS, November 2017**
  - Three themed zones (Diagnosis, Energy, and Food).
  - One general zone for Primary Level students (Fluorine), with a mix of scientists from different areas.

Above: *Click Zone Logos to visit the zones*

In IAS our engagement rates are improving. We have more schools taking part, more students registering, and — importantly — the % of actively engaged students (those who ASKed a question, took part in a live CHAT, cast a VOTE, or left a comment) is up to 90%. Numbers of questions asked and answers given are also both increasing.

While figures are improved in IAS however, this was not the case in IAE in 2017, with almost all metrics being decreased over the historic average. This is primarily due to having fewer schools take part than our target, which was in-turn due to decreased lead-time to promote the event because of late confirmation of funding in February. In mid-2017 we appointed a new member of staff to provide teacher support — such as

personally contacting teachers to ensure they knew how to get the most out of taking part — as well as teacher recruitment. This staff member was not in place during the February–March IAE event, where we had less teacher support available; this could explain the reduced percentage of students actively participating in the IAE event, as well as the increased uptake for the November IAS event.

Key figures for the events

	IAS			IAE		
	Historic IAS Zone average	2017 Zone average	2017 Zone total	Historic IAE Zone average	2017 Zone average	2017 Zone total
Scientists/ engineers	5	5	21	5	5	15
Schools	11	12	47	10	8	22
Registered students	369	384	1,538	284	284	852
% Active students	85%	90%	-	84%	80%	-
Questions asked	593	640	2,559	472	427	1,283
Questions approved	262	255	1,020	233	219	659
% Questions approved	44%	40%	40%	49%	51%	51%
Answers given	497	542	2,167	435	207	622
Comments	64	51	202	44	49	149
Votes	300	361	1,445	225	208	624
Live chats	16	17	68	13	12	37
Lines of live chat	4,136	4,469	17,876	3,331	3,113	9,339
Chat lines per chat	271	260	-	245	253	-

Audience

Primary audience

Our primary target audience are school students in Ireland; Primary Level, Junior Cycle (Secondary Level), and Senior Cycle (Secondary Level). Students are given access to the site by their teachers, to whom we promote the projects.

During the two events, our primary (registered on the site) audiences comprised:

- **867 people took part in IAE**, February–March 2017
  - 15 engineers
  - 852 students
- **1,559 people took part in IAS**, November 2017
  - 21 scientists
  - 1,538 students

Full zone breakdown is shown below.

		Registered students	% Active students[1]	Scientists /Engineers
IAS				
	Diagnosis Zone	506	86%	5
	Energy Zone	293	89%	5
	Food Zone	363	93%	6
	Fluorine Zone	376	92%	5
IAE				
	Energy Zone	310	76%	5
	Health Zone	223	84%	5
	Space Zone	319	79%	5
Total		**2,390**	**85% (average)**	**36**

Secondary audience

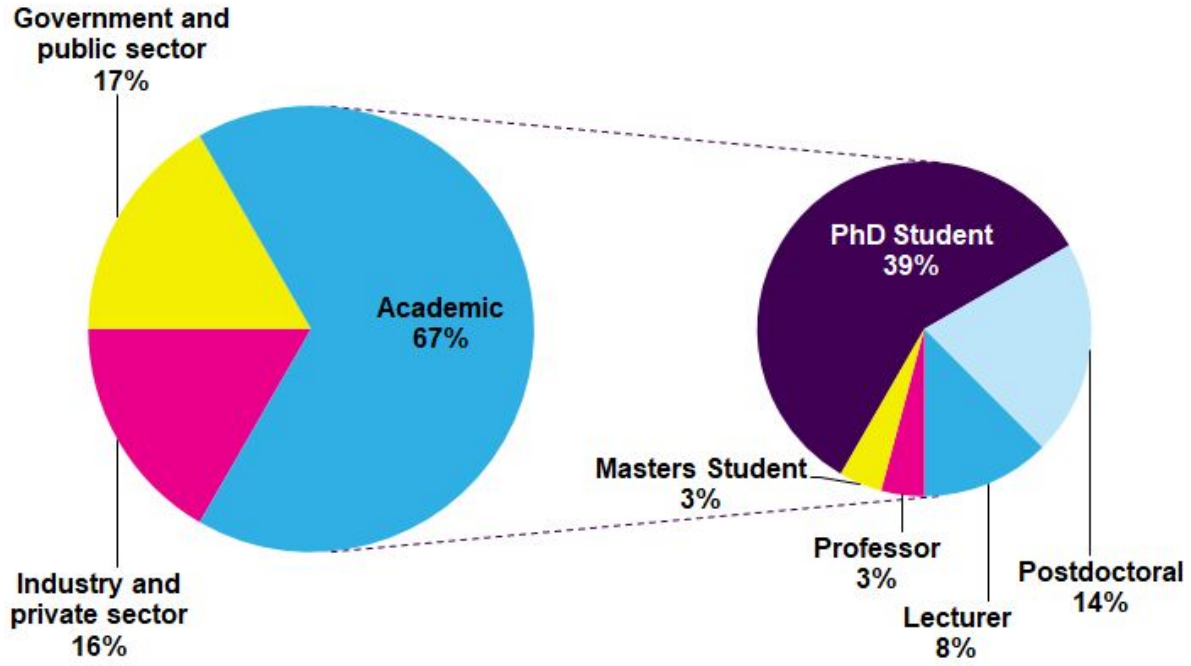
Additionally, over 103,000 people viewed the IAS site, and around 8,200 people viewed the IAE site in 2017.

[1] % Of registered students who submitted a question in ASK, took part in a live CHAT with scientists/engineers, commented, or cast a VOTE.

Scientists and engineers

Across the two projects we had a perfect gender balance, with 18 men and 18 women taking part. In IAS, the balance was 10M:11F, and 8M:7F in IAE. 4 out of the 7 winners were women, however there was a noticeable split between the two projects; all of the winners in IAE were men, while all 4 winners in IAS were women.

8% of the participating scientists and engineers were from a black or minority ethnic background.



Above: *Work sectors of participating scientists and engineers, and academic levels.*

The scientists and engineers represented a wide range of science and technology, the majority based across Ireland. There were also some people educated in Ireland now working abroad, one in the UK, one in Japan, one in the US, and one working at the European Space Agency in The Netherlands

The proportion of non-academic participants taking part was 33%, a lower proportion than we would have liked. This was primarily down to few non-academics taking part in IAS. There were fewer applications from people relevant to the themed zones, and four non-academics initially selected to take part, weren't able to do so.

Previously we reached new non-academics successfully through their professional membership organisations and learned societies. These organisations usually need more time to fit in promotion, through newsletters and news posts, than academic

groups who can be reached by direct email addresses. In the future, we need to make sure we contact these organisations early and regularly, potentially before zones themes have been announced.

Above: *Maps showing locations of participating scientists and engineers.*

Place of work	Number of scientists /engineers
NUI Galway	9
Teagasc Food Research Centre	3
UCD	3
DIT	2
UCC	2
University of Limerick	2
TCD	2
Airbus	1
EirGrid	1
Ireland's Centre For High End Computing	1
Maynooth University	1
MIT	1
Planet Zebunar	1
Royal College of Surgeons in Ireland	1
Self-employed	1
Shell Ireland	1
Space Robotics Laboratory, Tohoku University, Japan	1
TechWorks Marine	1
The European Space Agency	1
Tyndall National Institute	1

This variety of participants worked to improve students' science capital. Students saw relatable role models — people like them — and helped them to see STEM and STEM careers as something for them.

Students

A key part of our project mission is to reach students who do not normally get opportunities to meet scientists and engineers. In the UK our research has shown that schools 30 minutes or more drive from a university are half as likely to get a visit as those who are within 15 minutes drive.

In IAE, 22 schools took part, 5 of which were target schools (DEIS or in a target county). In IAS, 47 schools took part (more than expected given we ran only 4 zones), 32 of which were target schools.

In total, 1,111 students from target schools actively participated in the events (asked a question, joined a live chat, cast a vote, or left a comment). This is 54% of the active participants.

This indicates our success in using online engagement to reach students who are normally under-served by the sector.

Evaluation

There are two main strands to our evaluation:

1. **Formative** — We continually review our activities and look for improvements in what we do and how we do it. To this aim we use web metrics, observation of schools during the event. Formative evaluation helped us find out:
    - Improved communications with teachers and scientists through more streamlined emails.
    - We tested 24 hour email reminders to teachers about their chats and found teachers were less likely to forget / cancel a chat without telling us.
    - We ask teachers in the feedback survey what advice they would give to new teachers taking part. We have produced a 'top teacher tips' sheet for March 2018 Teacher Packs with the most popular tips.
    - We tested using words in student usernames, replacing random letter and number sequences in the hope that this would make registration simpler and quicker for students. We also wanted to test whether this would make students more recognisable when they do not change their display name from the default; thereby making engagement easier between students and scientists.
    - We're developing functionality to allow students to visit other zones and ask questions.
2. **Summative** — Thanks to site metrics we can see exactly how students and scientists are interacting: how many questions are asked, how many votes are cast, which are the most active schools and scientists, and other measures. The 2017 Zone Reports are available on the IAS and IAE sites.

With the help of online surveys we look at scientist and engineer public engagement behaviour, as well as students' attitude to science and engineering.

Scientists and engineers

From the post event surveys, we found that 76% of respondents felt the experience made them more confident in communicating their work, while 96% of respondents felt that after the experience they'd like to take part in more public engagement, both of which are key indicators of an improved attitude to public engagement.

Scientists and engineers commented on how the online format of the activity meant that they could engage with a high volume of students without the added burden of physical travel:

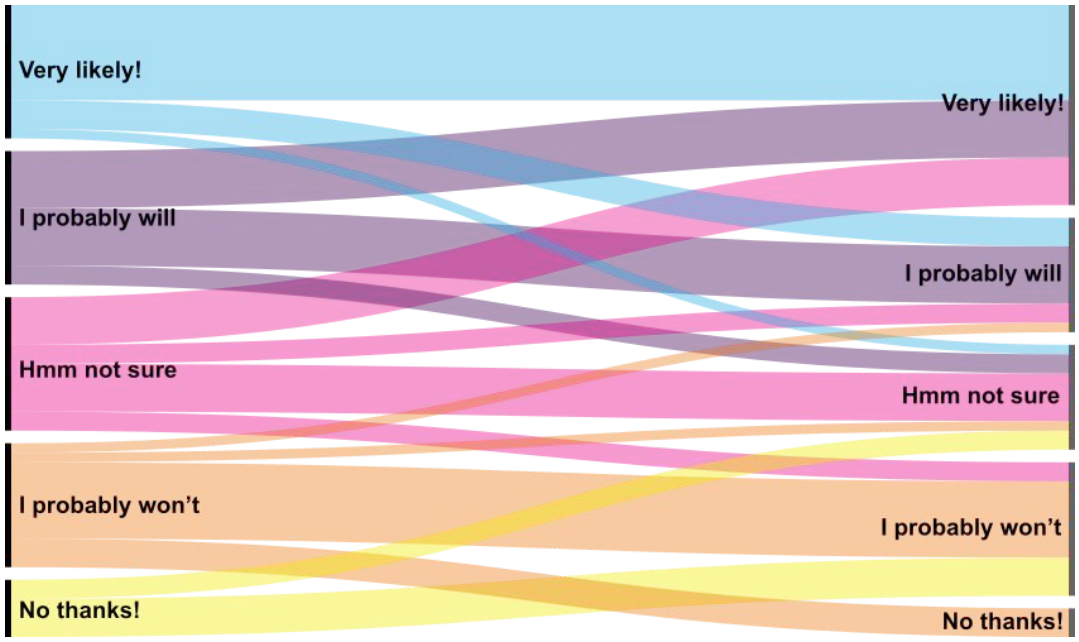
"'I think it's a great avenue for engagement with a large volume of students, us scientists didn't have to leave our desks and I'm sure it was exciting for the students to be using an online chat"

"'I think the format is excellent. I think students find it easier to ask questions over a keyboard than to ask out in class so I think it's a great platform for communicating"

— Feedback from post event surveys

Students

Students were asked before and after taking part in the events how likely they were to look for a job in STEM: "When you finish your education, how likely are you to look for a job that uses your science knowledge and skills?" in IAS, and "Would you like to work as an engineer in the future?". The alluvial diagram below shows how their responses changed before and after the events.



Above: *Alluvial diagram showing students responses before and after taking part in the events, when asked about the likelihood of looking for a career in STEM, or using their STEM skills.*

Most students state feeling more positive about working in a STEM career after their involvement in IAS or IAE. However, for a proportion of those not initially considering a STEM career, the event confirms their decision.

Of those students who answered that they either did not think or did not know if jobs relating to STEM were interesting, 55% changed their minds completely and after the event answered that such jobs were very or fairly interesting.

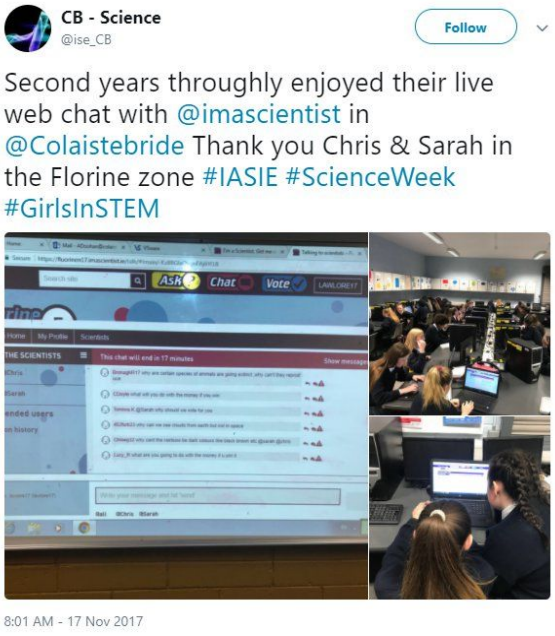
Free text answers highlighted a change in perspective on STEM subjects in general and STEM careers, with many students highlighting how the activity changed their perspectives on science and engineering:

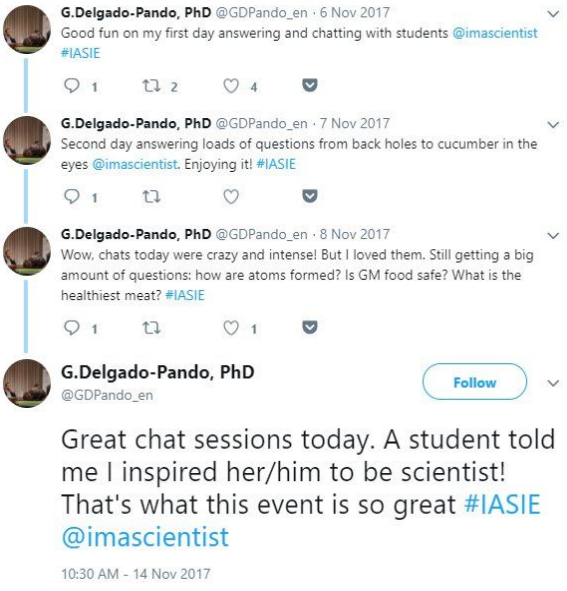
> *"It's not all boring some things they [scientists] do are actually interesting''*
>
> *"That science can actually be fun"*
>
> *"All of these scientists are very inspiring and each have excellent ideas"*
>
> — Feedback from post event surveys

Media coverage

We had extensive social media coverage by scientists, engineers and teachers posting about their experiences on Twitter. We also covered the event in our team's twitter line and encouraged our event moderators to do the same. Funders and the institutions where candidates worked at also helped keep the buzz on social media.

Hashtags were used during the events (#IASIE and #IAEIE) to allow the quantification of our impact in Twitter. Below are some examples:





Above: *Click screenshots to see tweets.*

Various education groups — such as ISTA, and Smart Futures — and university outreach officers shared information about the projects with their networks to help promote the events and recruit teachers, scientists, and engineers.

Challenges and future direction

Our objective was to run eight zones across the two projects (five IAS, three IAE), but we only ran seven (with one fewer zone than planned in IAS). This is due to loss of funding from the Royal Society of Chemistry. We are two years into a five year Sustaining Excellence Grant from the Wellcome Trust that is intended to help us find ways of becoming sustainable. We are having success in adapting our platform to improve our efficiency and to be able to roll out new sister projects bringing down our core costs and enabling us to reach new audiences.

We are piloting new projects such as the Careers Zone which we hope will attract corporate funding such as our pilot sponsorship from Wessex Water.

We are increasingly successful in getting UK universities funding the project as part of their Widening Participation agenda and intend launching a Global Corporate fundraising programme.

Fewer schools took part in IAE than we would have liked. One reason for this was the short lead time in the run-up to the event, where we did not have adequate time to promote the event to schools and teachers, when funding was only approved in mid-January. We also lacked close support for schools in the February–March IAE event, though overcame this by hiring a new member of staff to provide this support, who was in place for the November IAS event