

'They are waiting for you to take the stage, Mr Scientist' – a modern science show

■ Joseph Roche

Scientists feel a lot more comfortable in their laboratory than they do on a stage in front of thousands of people. This is true of every scientist I know and it is certainly true of me. We are even further from our comfort zone when we are carrying out scientific experiments on that stage and trying to 'wow' the audience with our craft. Earlier this year, I was standing in front of 1900 expectant faces for the tenth time in three days, at the BT Young Scientist and Technology Exhibition in Dublin, hoping not to accidentally set myself on fire or spill liquid nitrogen everywhere, and I found myself thinking back to how I had managed to end up in a science show.

When I was first invited to develop a science show, I was very reluctant to accept the invitation. Although I like the challenge of engaging the public with science, I was unwilling to undertake the development of a science show because I still recall how utterly unimpressed by them I was as a child. I remember them as being quaint performances by science enthusiasts, aiming to impress a young audience with scientific demonstrations in the same style that a magician might use tricks to entertain a crowd.

When I started looking at the state of the field and who else provides science shows, I was struck by how little things had changed since I was a child, and how often the shows did not have any active research scientists involved in their production. Maybe there was a time when a science show could impress



The scientific demonstrations in the Roney & Joe Science Show illustrate how scientists collaborate in order to understand the world around them.

an audience if they had never seen scientific demonstrations before. These days, the likelihood is that, if it is a really interesting science demonstration, unless it is an original creation the students might have already seen a video of something similar online. Traditionally, science shows cater for young people, but do not provide them with a clear idea of what life might be like as a scientist. Often they fail to take advantage of technology that could allow engagement with the audience. It seemed as if we were missing an educational opportunity and that is what eventually convinced me to become involved in the production of a modern science show.

The BT Young Scientist and Technology Exhibition (BTYSTE) was the venue for our show. It is a schools science project competition that has been running for 51 years, making it one of the longest running exhibitions of its kind in the world, as well as one of the largest. It tends to have more than 2000 entrants and up to 60,000 people visiting the exhibition over three days. The organisers of the Exhibition were keen to include a 'special act' of Irish scientists showcasing their work on stage. Having seen work produced by scientists in Trinity College Dublin collaborating with the Science Gallery, the organisers of BTYSTE invited us to propose a new and modern science

show. With the support of the Science Gallery production team, we designed a show with a clear objective in mind. Science shows should be treated as an opportunity to connect directly with a large audience of people who might want to learn more about science, or maybe even become scientists. We felt that we had a responsibility to provide a show that would be educational, inspirational and entertaining.

The show we designed was a 20-minute, two-man performance by myself and my long-term collaborator and comrade, Dr. Ronan Cullen. If I was going to suffer on stage in front of an audience, I could at least take confidence from dragging one of my oldest friends into the limelight with me. Interdisciplinarity was at the core of the show, as my background in astrophysics and science education complemented Dr. Cullen's research area of physical chemistry and his vast lab experience. We called the show 'The Roney & Joe Science Show', as that is how we refer to each other when we work together in the lab and, more than anything, we wanted the young people in the audience to get an honest insight into what it might be like to be a scientist. The show consisted of a series of demonstrations that explained how scientists work together to understand the world around them. It incorporated traditional science show elements such

as fireballs, liquid nitrogen, levitating superconductors, chemical reactions and 500 ping pong balls exploding from a rubbish bin, as well as a modern interpretation of audience interaction.

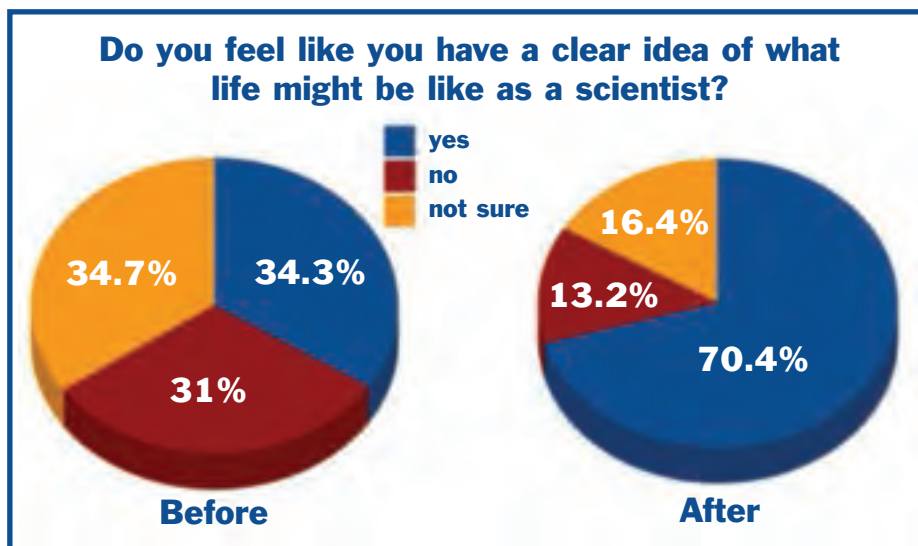
This interactivity was achieved by taking advantage of the near ubiquity of smart devices in every audience to use live polling software to ask the audience questions, on screen, throughout the show. In this way, the audience could vote on the outcome of the scientific demonstrations on stage and see their opinions being collated on screen. Ten shows took place in the BT Arena at the Royal Dublin Society (RDS), with crowds of up to 1900 for each performance, consisting mostly of post-primary school students. We strived to give these students a realistic depiction of our daily life working as scientists and, by taking before-and-after feedback from a cross-sample of 1191 audience members across the 10 shows, we felt that we could demonstrate an increase in the audience's insight into life as a scientist.

The show was deemed pioneering and progressive by the Irish media and featured on national news and in *The Irish Times* as one of the top five things to see at the Exhibition. While these were proud successes, there were mistakes too. In the midst of the positive feedback gathered from the audience, some comments suggested that the audience would have liked a longer show. We also scared a few people with one of the explosions. The biggest chance we squandered was that we did not have any female presence on stage. We had underestimated how much the younger audience members might see us as role models. We had shown the audience what it is like for two young men to work as scientists, but some of the feedback highlighted how female audience members might have found it easier to identify with a female scientist. That is something we would need to address in future iterations of the show.

While we had envisioned the show being exclusive to a single event, its originality has resulted in it getting more attention than we anticipated. We received requests to perform the show elsewhere in Ireland and, thanks to the continued support of Trinity College and Science Gallery, we will be performing the show at the Electric Picnic arts-and-music festival. It will also feature at the Seventh International Conference on Science in Society in Chicago in October 2015. We are working to secure funding



Audience members interacted with questions on screen using their smartphones. 1191 audience members across 10 shows were asked before and after the show if they felt they had a clear idea of what life might be like as a scientist.



that would allow us to bring the show to an international audience and showcase it to the wider science and creative arts communities, to open up potential for collaboration. We are continuing to work in this area, because we hope that it will encourage the public to demand more from science shows. Nothing will make a scientist crave the sanctuary of their lab more than that vulnerable feeling when you are carrying out a scientific demonstration on stage in front of an expectant audience. Our experience has taught us that it might just be worth it if it challenges us to find new ways to engage the public with our research.

Dr. Joseph Roche is an astrophysicist at Trinity College Dublin. He has worked at NASA, used the Hubble Space Telescope to observe symbiotic stars and served as Education and Learning Manager for Science Gallery Dublin.

He is Assistant Professor in Science Education at Trinity's School of Education, where his research area is the role of science in society.

Twitter: @joeboating