Organising and running a STEM engagement stand inside a supermarket

Project report and evaluation for ‘Science in the Supermarket’

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Imperial College
London

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Introduction to Science in the Supermarket

Imperial College London provides funding, as part of its Societal Engagement Seed Fund, for staff and students to develop their own engagement activities. It has a range of priorities including developing high-quality engagement with research that strengthens research impact; extending existing successful engagement activities; undertaking pilots of pioneering engagement activities and developing the engagement skills of the university community. Science in the Supermarket was a trial project, funded by Societal Engagement Seed Fund at the beginning of 2018.

The project’s primary objective was to promote and encourage the study of STEM subjects by engaging the families of young children in the Somerset area.

The campaign targeted families with low science capital to promote the acceptance rates of students from these backgrounds into higher-education programmes. Science capital is a concept developed through the ASPIRES research project into young people's aspirations, and is defined as “science-related qualifications, understanding, knowledge (about science and ‘how it works’), interest and social contacts (e.g. knowing someone who works in a science-related job)”.

The target audience was 8-12-year-olds, living in the Somerset area, from family backgrounds with low science capital. However, rather than directly targeting this demographic, the project focused on reaching the parents and families of these children. The rationale for this approach was supported by previous reporting and research in relevant areas:

- by secondary school age interventions have less meaningful impact on students’ aspirations,
- parents and familial background are major influences of students’ career choices and aspirations, with students from low science capital backgrounds less likely to aspire to STEM related careers,
- research by the Behavioural Insights Team, and the Somerset Challenge found that young people from schools in Somerset are “less likely to attend university despite having good A-level results”,
- university application rates from the South West continue to decline relative to the national average, with Somerset containing multiple wards with the lowest participation rates in higher education (POLAR4 quintile 1 HEFCE classification). Applicants from lower participation regions are less likely to receive offers to study at Imperial, and are under-represented within the student body,
- Somerset is relatively isolated due to its distance from HE providers, which is a barrier to existing engagement and outreach programmes.

The project attempted to achieve its primary objective by:

- running a trial engagement stand in a supermarket(s) across Somerset over one weekend (two days’ total) during Spring 2018,
- recruiting four volunteers, including students, scientists and technicians from the Imperial community, to operate the stand,
- promoting the event to local media (print, radio, television), in the target areas,
- working with the volunteers ahead of the visit to find interesting artefacts and/or develop relevant demonstrations related to their role,
- using the artefacts/demonstrations both to engage children, and facilitate more in-depth conversations with parents (for example: blowing bubbles to represent cell membrane, allowing the child to play while chatting to parents/guardians),
- providing A5 information cards to distribute to parents, detailing:
  o simplified case-studies of successful scientists and technicians (ideally from the West Country, or of similar rural background),
  o links to further engagement resources and/or opportunities in the South-West via a central campaign website,
- incorporating a sticker wall, featuring different STEM roles (including different types of scientists and technicians), which challenges children to pick the role they would most like to be.

This document represents the final report and evaluation for this project. It was created to bring together the findings of the two-day trial, to guide future continuation of this project. It is made available as a reference for others interested in carrying out similar engagement activities.
Purpose and limitations of this evaluation

This document predominantly describes qualitative, self-reflective assessment of the performance of this initial trial. This is not a scientific, rigorous assessment – this was beyond the scope of what can be achieved in a volunteer-led project, led by non-specialists in evaluating impact.

However, to maximise the efficacy and value of the project, significant time was spent using the findings of adjacent studies and projects to guide decisions (as referenced in the introduction). This is a limited data set, and it became clear during the project that there is scope for increased academic research into effective engagement strategies, as well as greater dissemination to scientists who practice public engagement.

To that end, this document aims to contribute to that literature, and provide a set of observations that can provide insights for either future engagement, or academic research projects.
Executive Summary

The following summarises the contents findings of this report.

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<td>A standard table/layout was required to meet the transport requirements of the project; alternative layouts would incur greater transport costs. The total table area should be proportional to the number of volunteers to be used effectively.</td>
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<td>Engagement activities</td>
<td>Having more than one activity improved the engagement experience, by giving participants choice. Having different levels of activities allowed interested adults to find out more about the underlying research. Allowing participants to take home a souvenir from the activity was well received. The online health atlas allowed people to look at data specific to their local area, making the activity potentially more engaging. The activities offered had to be tuned on the day, as the children engaged were slightly younger than anticipated.</td>
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<td>Interacting with participants</td>
<td>The choice of language and style of approach appeared to impact participants’ choice to engage with the activity. Using pairs of volunteers, one to engage the adult, one the child, proved an effective way of communicating different messages to different audiences. Pre-packaging handouts into bags, while highlighting relevant resources to adults, proved a time-effective way of managing busy periods.</td>
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<td>28</td>
<td>People engaged</td>
<td>217 children were engaged over two days (11.5 hours), and approximately 300 adults, a total of 500 individuals.</td>
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Anecdotally most participants lived and worked locally and were from low to medium science capital backgrounds.

| 29 | Meta-evaluation | Stickers provided an easy means of tracking participant numbers. Feedback forms were deemed not appropriate for an event with a relatively short interaction time. Future projects would benefit from incorporating social scientists/relevant people with surveying skills into the project. Website analytics have the potential to provide valuable insight, but raise data protection issues, requiring formal privacy policies. |
| 30 | Costs | Overall the project underspent by £240.24, thanks to volunteers staying with family locally, reducing the accommodation costs. Travel to the event cost more than anticipated due to business insurance restrictions on car hire. It is estimated that approximately 185 hours of volunteer time was required to run the project. For future events the additional cost of transport should be factored into the budget. |
| 32 | Volunteer feedback | Generally, volunteers felt the project met its primary objective; the stand location in store could be improved, as was getting parents to stop at the stand after finishing their shop and a greater number of volunteers on the day would have helped reduce the workload. |
| 33 | Appendix A: email to supermarkets |
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The project duration was approximately one year, from the announcement of the funding call, to final evaluation and reporting, as detailed below:

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<td>Website request/construct website</td>
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<tr>
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<td>Approach supermarkets/Volunteers confirm volunteers/Source external</td>
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<td>May</td>
<td>leaflets/resources</td>
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<tr>
<td>Aug</td>
<td>Evaluation &amp; reporting Resource sharing</td>
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<tr>
<td>Sep</td>
<td>Evaluation &amp; reporting Resource sharing</td>
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<td>Oct</td>
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<td>Dec</td>
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- **Sep**: Project announcement
- **Oct**: Application writing
- **Nov**: Application submission
- **Dec**: Response to reviewers
- **Jan**: Full funding confirmed
- **Feb**: Funding available
- **Mar**: Detailed planning
- **Apr**: Website request/construct website
- **May**: Approach supermarkets/Volunteers confirm volunteers/Source external leaflets/resources
- **Jun**: Training session
- **Jul**: Run event
- **Aug**: Evaluation & reporting Resource sharing
- **Sep**: Evaluation & reporting Resource sharing
- **Oct**: Evaluation & reporting Resource sharing
- **Nov**: Evaluation & reporting Resource sharing
- **Dec**: Evaluation & reporting Resource sharing
Identifying target region

The project aimed to reach young people in the West Country from regions typically under-represented in higher education. Participation in higher education varies considerably at the sub-county level. Areas were identified using Participation of Local Areas (POLAR) data, as provided by the Higher Education Funding Council for England (HEFCE).

Note: HEFCE was closed at the end of March 2018, and some of its functions incorporated into the new Office for Students (OfS). Currently the OfS continues to host this data set.

POLAR quintiles are a classification of the likelihood of 18-19 year olds participating in higher education for different geographic regions. A POLAR quintile of 1 represents “least likely to participate” areas, a quintile of 5 represents “most likely to participate”.

Figure 1 shows the POLAR4 dataset for the West Country, centred upon the county of Somerset. It indicates the large variation in participation, even within the same town/city. From this, target towns were identified, based on their POLAR quintile classification:

- Bridgwater
- Chard
- Dunster
- Radstock
- Shepton Mallet
- Street
- Taunton
- Weston-super-Mare
- Yeovil

**Figure 1:** selection of POLAR4 higher-education participation data, centred on the county of Somerset. Image from HEFCE website, accessed December 2017.

**Summary:** the POLAR dataset provides a valuable resource for helping decide where to target engagement efforts, and highlights how county- and regional-level data may not have the resolution to accurately identify areas. The data appears to be limited to participation in higher education (i.e. university) so may not be useful for tracking vocational STEM careers.
Contacting supermarkets

It was discovered there are broadly two mechanisms for booking space within a supermarket:

1) as a commercial operation, paying for a concession stand;
2) as a charity, without cost.

Some companies use external agencies to handle commercial bookings, for example Tesco. There appears to be some scope for this agency to handle charity bookings, however as the university has exempt charity status (i.e. doesn't have a charity number) they were unable to process the booking without charging. The commercial rates quoted varied significantly as a function of store location, day, and region within the store (e.g. foyer or car park), the cheapest was ~£150 per day, the most expensive ~£300 per day.

To avoid incurring charges, supermarkets were instead approached via their local Community Champion (see appendix B for email). Most major brands appear to have Community Champions, members of staff who coordinate engagement with the local area (for example, selecting which local organisations should receive money from the in-store token donation scheme).

The names for Community Champions can be found on some supermarket websites, however, in some cases it was hard to find individual contact details. For some stores, contact had to be initiated through a general enquiry system which significantly increased response times (many weeks). Not all Community Champions were full-time employees, making it a challenge to reach them during normal working hours. One useful strategy was finding the right shortcut keys to bypass automated telephone systems and reach the customer service desk in the store, before asking to speak directly with the relevant staff member.

Once the target towns had been identified (as described above), preference was given to areas with large supermarkets and shopping areas with high footfall:

- Yeovil (Asda, Morrisons, Tesco, Lidl, Co-op)
- Taunton (Sainsbury’s, Asda, Lidl, Tesco, Morrisons)
- Bridgwater (Asda, Iceland, Morrisons, Co-op, Aldi, Sainsbury’s)
- Street (Clarks Village outlet, Sainsbury’s, Lidl, plus Aldi, Tesco in nearby Glastonbury)

A total of seven supermarkets and shopping areas in Yeovil, Taunton and Street were approached to host the event. Of these, contact was established with four. One declined to participate, one was unable to offer a date that worked with the project volunteers, of the two remaining, the Tesco Yeovil Extra branch was selected for practical reasons (good transport links, plus local family support).

Summary: contacting supermarkets took considerably more time than anticipated. Not all companies are interested in hosting events. However, most major brands specifically engage with the local community, and once contact was established, it was relatively easy and free-of-charge to book space in a store.
Sourcing volunteers

A key part of this proposal was involving scientists from similar backgrounds to the target audience, to take advantage of the benefits of using attainable, realistic role models.\textsuperscript{1,14} Focus was placed on finding current scientists at Imperial College London, who were originally from the West Country and from a state-school background, i.e. most similar to the target audience.

Employment/student records are naturally not available for this purpose – however many people publically publish their previous schools and employers on online social networks. LinkedIn, a professional networking website, was used to identify potential volunteers, by searching for West Country town names plus Imperial College London. Google searches also identified staff members with websites that included reference to their home regions.

While it is likely many people are not covered by this search approach, nine individuals were identified by this process, of which five people were approached to take part in the project via email (see appendix A). Ultimately, three volunteers plus the project coordinator took part (including two volunteers, one not originally from the West Country, who were covering absences at short notice).

Recruiting additional volunteers at short notice, to cover absence, added considerable complexity to the project. It also meant these individuals didn't receive training before the event (discussed below). Increasing the number of volunteers involved in the project would have helped avoid this issue.

Targeting volunteers in this manner adds considerable time cost to finding people, and involves approaching individuals who may not have had prior outreach/engagement experience. It’s challenging to directly evaluate the impact of this approach, however anecdotally it was noted that local connections be used to start a conversation and engage participants on the day. Similarly, the local connection can be a motivating factor in volunteers taking part, and introduces new scientists and researchers to public engagement projects (one of the key objectives of the Societal Engagement Seed Fund). There are also practical considerations – the project saved a considerable amount of money on accommodation costs for volunteers who could stay with local family.

Summary: the impact of using local volunteers is difficult to quantify, but can provide a useful talking point when engaging people, and can reduce costs (by taking advantage of family) at the expense of greater planning complexity. For future projects the number of volunteers should be large enough to accommodate last-minute changes in availability.
Using and creating resources

The project took advantage of existing STEM engagement resources, and created a smaller quantity of bespoke handouts specific to the West Country area. Using existing resources was motivated by a desire to minimise the fragmentation of STEM engagement messaging (there are already many campaigns tackling this problem), as well as reducing the time and cost required to re-create resources that already exist.

One resource that didn't already exist was a series of case study cards, profiling current West Country Scientists (see figure 2). These were aimed at reinforcing the attainable role model approach of the event, and profiled three scientists (two of the volunteers, plus one additional Imperial-based colleague). Five scientists were approached to act as case studies (including the project coordinator), and three agreed to take part. Cards were consistent with the project branding, and printed as handouts for the event, as well as being made available online via the project website under a Creative Commons license.

Leaflets and resources were requested from five organisations involved in STEM engagement. Of these, two responded: the WISE campaign (Women in Science and Engineering), who gave permission to reproduce their ‘People Like Me’ content (see figure 3); and the Institute of Physics who provided a large number of different leaflets on physics and engineering, as well as promotional ‘bugs’ (fluffy, branded toys). The latter proved very popular with young children. In addition, a freely available poster from the Ada Lovelace Day campaign ‘What Kind of Scientist Could I Be?’ was also used as an activity on the stand (described below).

This approach reduced some of the costs and time involve in producing resources (although printing costs still comprised a significant proportion of the overall budget), leveraging some of the extensive STEM engagement work that has already been done. The disadvantage is that not all resources are ideally tailored towards the target audience. Some resources were aimed more towards GCSE and A-level children, and were less relevant to the project’s target demographic.

Feedback from participants and volunteers also highlighted the kinds of resources that families of younger children (<10 years old) prefer, e.g. simple science activities that can be carried out at home.
“[It would be good to provide parents] with more tailored printed information and maybe something for the children to read at home like a little story book or colouring/sticker sheets to be sure that leaflets don't go straight to the bin.”

Resources of this type already exist (the Institute of Physics’ Marvin and Milo series)\(^1\), and should be considered for future events.

**Summary:** using existing resources significantly reduced time and cost, at the expense of customisation to the specific project. For common engagement activities, such as reaching A-level students, existing resources were found to be excellent. Fewer resources were found that were aimed at parents/young families, and for future projects creating these should be considered.

**Figure 3:** cover of ‘People like me’ leaflet, as produced by the WISE campaign.\(^{16}\)
Branding and website

For the project the brand ‘Science in the Supermarket’ was created, along with a logo and consistent colour pallet. The initial plan was to outsource this design work to a professional designer, however the time constraints of the project made this unfeasible. For future projects a long lead time (>6 months) should be incorporated into the project plan.

Typeface and colour choices were inspired by existing outreach campaigns. The main logo and stylised text is constructed from the typeface McLaren, body text is Open Sans, both of which are freely available from Google Fonts. The website is powered by WordPress, an open-source blog/content management system, and hosted free-of-charge by Imperial College London. A colour pallet was algorithmically generated using Colormind, an online generator (see figure 4).

![Project colour pallet](image)

**Figure 4:** Project colour pallet; from left-to-right, hexadecimal colour numbers: FAF8F5, 898D88, 38BBE7, 735E67, 1F5599.

One issue encountered creating the website was a lack of available imagery before the event, making the site text heavy. Although not ideal, a stock image provided a suitable cover image to make a visually appealing landing page (see figure 5). For future events, incorporating photographs from the trial into the site will improving the overall appearance.

![Project website landing page](image)

**Figure 5:** Project website landing page, showing use of stock imagery.

The website aimed to aggregate existing content to provide a bridging point between participants and other online resources, including an interactive map of locations linked to STEM subjects around the West Country (see figure 6). There was a conscious focus to develop evergreen content where possible, that wouldn't rapidly become out of date. This is a reflection on the limited resources available to continually maintain the site after the project end date. Using a pre-existing content management system, such as WordPress, significantly reduces the amount of effort required to make minor changes and updates to the site. Hosting on a centralised
university server will ensure longevity of the site well beyond the end of the project funding period.

**Figure 6**: screenshot of interactive map embedded on project website, showing different locations around the West Country which have links to STEM subjects.

**Summary**: using open-source, and freely available online tools minimised the cost for implementing branding and the website. Professional designers would have been preferable but should have been engaged earlier in the project (>6 months before event).
Training session

A training session was held two weeks prior the engagement event, as an opportunity for volunteers to test out activities for themselves and to work with the university’s Engagement Coordinator. They shared their expertise and prompted volunteers to consider how to respond to a wide range of questions and situations. This level of training was appreciated by volunteers, as noted in their feedback:

“It was really useful having a meeting with [the engagement coordinator], to discuss her ideas and thoughts before the event.”

One logistical challenge was the recruitment of two volunteers at short notice, to cover absences, after the training session had already occurred. For future events, increasing the overall number of volunteers on the day would help improve the proportion of trained individuals, which would help to mitigate this risk.

Summary: providing training with engagement experts prior to event improved the confidence and ability of volunteers on the day. For future events, including a greater number of volunteers would help mitigate the risk of some unable to attend training.
Advertising and event timing

Prior to the event, 38 schools (predominantly primary) in an approximately 15-mile radius around the supermarket were contacted via email to advertise the event (see appendix C). Of these it’s unclear how many were reached, as only a single school responded (although this is not atypical in a busy school environment).

A press release for the event was produced in consultation with a journalist (see appendix D), and four local media outlets were contacted, with no response. During the event, there was no indication that any participants were aware of the event prior to visiting the store.

The event was held on the weekend of Saturday 28th and Sunday 29th July 2018. In Somerset, this was the first weekend of the school summer holidays and was particularly wet weather. According to discussion with a member of in-store staff, the number of parents/young people is greater during the holiday period, and particularly during poor weather.

**Summary:** the approaches taken to advertising the event were ineffective. Future events should consider developing a more in-depth advertising strategy. Anecdotally, holding the event on a weekend, during school holidays, and/or wet weather may result in greater footfall in store.
Operating in a supermarket environment

Staging an engagement event in a supermarket was motivated by trying to find locations where both young people and their families are present simultaneously. Supermarkets are also neutral ‘third spaces’ that allow all parties to meet on equal terms, rather than a hierarchical environment, such as a university or science museum.\(^1\)

During research for the project, only a handful on reports were found describing science engagement inside a retail environment. The main example was the ‘The Heart and Lung Repair Shop’,\(^2\) a large project which operated entire pop-up stores build around a health theme. The closest similar event was a stand organised for the MRC Festival of Medical Research,\(^3\) which engaged people in retail spaces about genome editing. These events reported good engagement with a range of publics, lending credence to the choice of running a stand inside a supermarket.

The major challenge of operating inside the supermarket was the visual complexity of the environment. Unlike pop-up shops, which have domain over an entire space, an engagement stand within the store is competing with a huge number of other display elements, all trying to attract a shopper’s attention (see figure 7).

Ironically, deliberate design choices to minimise the amount of signage and emphasising a clear/white design may have been detrimental in this environment. There are only a few seconds to grab a person’s attention while they walk past. In hindsight, a more visually dramatic display may be required to have a greater impact, and highlights the potential benefits of incorporating a professional designer (ideally with retail/product experience) into the project.

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Figure 7: examples of visual distractions around the engagement stand (stand is in centre of image).
Conventional academic display elements such as conference-style roller banners were avoided, on the assumption that this style of display would present a corporate-style image and a barrier to engagement. However, it was noted on the day that the supermarket (and a commercial concession stand operating that weekend) made effectively use of bold/brightly coloured roller banners to catch the eye.

A constraint of booking space in the supermarket as a charity is the limited choice over stand location, which is dictated by the supermarket. While for the trial the stand featured in a prominent location in the foyer, intersecting both upper- and lower-level exit points, it wasn’t immediately visible to shoppers entering the lower-level (main) entrance. The immediate sight-line upon entering the store is dedicated to current promotions. However, the stand was directly located in the sight line of the upper-level entrance, and visible as customers travelled down into the store on a travellator (see figure 8).

![Figure 8: How visitors saw the stand while travelling down travellator from upper-level entrance.](image)

It was generally easier to engage people entering the store, rather than exiting. This also highlights another important constraint of operating in a supermarket – some customers don’t want to spend significant time inside the supermarket, as noted by the volunteers:

“Most people tend to want to get in and out of a supermarket quickly, and haven’t factored in time to talk to people. This meant in these times (e.g. lunchtime) it was especially difficult to engage people. Additionally, the positioning of the stall meant that we couldn’t catch people going into the store... Families go to the supermarket with an in-out agenda.”

“The main thing that I noticed in the supermarket environment was that although the children had lots of energy and were willing to get involved, parents were usually quite tired out by the time they had finished their shopping.”

“People seem to be more in a rush to get out of there, and also with so much stimuli around maybe the stand did not stand out.”

Excuses given by people who were approached for not engaging were often related to a lack of time, i.e. too busy, need to get somewhere else, kids are tired, etc. In an absence of data, it’s difficult to know whether fewer people engaged in the supermarket environment than would in other locations, or whether the choice to not engage is far more visible. Anecdotally, compared to participating in science festivals or going into schools, approaching people was more demanding due to the steady rejection. It’s mentally challenging for those running the stand to maintain
enthusiasm in such an environment. At the same time, a significant number of people had quality engagements with the stand (discussed below), with very few periods of prolonged quietness.

More data is needed to make a definitive evaluation of the potential of working in supermarket spaces. Volunteer feedback also suggested other locations that could also be considered to achieve a similar aim:

“I think that everything about the stand worked really well - the only problem we seemed to have was the position of the table, which I think could be improved if we were in a shop with a slightly different entrance layout!”

“Other locations to consider could be a playground or a green area near a high street, where families typically spend free time.”

It was an active aim of the project to operate in an unusual engagement environment – undoubtedly setting the same stand up outside a science museum in a city would engage far more people – but most likely not the target audience for this project. However, there is still scope to explore other locations too.

**Summary:** the supermarket was found to have a high footfall of the target audience of young families, at the expense of being a complex visual environment. For future events in supermarkets, a visually more dramatic stand with greater wow factor is required. Other locations should also be considered, which could potentially reach the same audience.
Engagement stand

A range of different styles of engagement stand were considered, including round tables and roller banners. However, it quickly became clear that non-standard equipment (such as large folding round table) is significantly more expensive and harder to transport. This was one of the challenges of carrying out the event in a location remote from the university. All equipment needed to fit into a single vehicle. The amount equipment that needed to be transported also ruled out cheaper travel options, such as travelling by train.

![Figure 9: left: photograph of initial L-shaped layout, which was difficult to manage. Right: photograph of the final single table layout (with second table used behind for organising resources).](image)

In the final design two folding trestle tables were used, along with two flip boards for displaying signage. Flip boards were chosen because they could be display content at a lower height – better suited for young people, and to allow them to easily place stickers on one of the boards. Initially both tables were used, forming an L-shaped stand (see figure 9). However, this space was too large to effectively manage with four volunteers, so ultimately this was reduced to a single table configuration. The second table was still useful – providing a staging space to sort out leaflets and store other resources underneath).

![Figure 10: scaled-up model of a biomaterial to illustrate the research linked to the bubble-blowing activity.](image)

A separate smaller exam-style table was converted into a model representing a biomaterial, along with toy cells (see figure 10). This was designed to provide a visual hook for people walking past. This did catch the attention of some participants, although one or two people misinterpreted the stand as selling these toys (perhaps indicative of people's initial impressions in a retail environment).
Volunteers were told to dress as they would normally, a deliberate choice to avoid lab-coat style stereotypes of scientist, and identified via large ‘festival-style’ lanyards showing their name (see figure 11).

**Summary:** a standard table/layout was required to meet the transport requirements of the project; alternative layouts would incur greater transport costs. The total table area should be proportional to the number of volunteers to be used effectively.
Engagement activities

Four activities were prepared:

1) bubble-blowing, followed by staining the bubbles/liquid with food colouring, as the basis for talking about cell membranes;
2) using air-drying clay to make to 2D models of a heart, followed by decoration with components to represent air pollution;
3) an interactive tablet, linked to the Environmental Health Atlas, a research project that maps the distribution of pollutants and health conditions across the UK;
4) an activity that asked young people to place a sticker against the type of scientist they’d like to be, on a large poster.

The benefits of having multiple activities was noted by volunteers:

“The two different activities, as these drew people to the stand, enabling us to start conversations."

“The activities were attractive for children and simple enough to have in a stand. The interactive map in the tablet was very interesting for the parents while the kids played.”

The bubble-blowing attracted the most attention from participants, possibly because there is a rapid visual effect that can be demonstrated by the volunteers. During the activity, the volunteer guiding them through linked different elements to different aspects of cell membranes and a new way of delivering drugs into cells. This then linked into a model of needles and toy cells, which was a visual representation of the underlying research.

“The fun activities for the children that were easy and simple to explain but could be linked to scientific ideas.”

One disadvantage of working with bubble mixture is the mess - participants frequently spilt bubble mixture onto the demonstration table. This was mitigated by using only small quantities of bubble mixture in each dish, and by placing A3-sized laminated mats under each activity (see figure 12). This meant most solution could be mopped up using paper towels between participants. Any excess was absorbed by the polyester tablecloth.

Figure 12: left – photograph of the stand (start of day), showing stations for bubble blowing. Right – straws, plastic pipettes and food colouring for bubble-blowing activity.
The modelling activity involved providing a participant with a small quantity of air-drying clay, and instructing them to roll it out and use a range of organ-shaped cookie cutters (representing the lungs, brain, heart or a double helix of DNA). Participants could then decorate their model with glittery plastic components (see figure 13). This formed a basis for talking about the impact of pollutants in the environment which can accumulate/affect different organs. A popular part of this activity was that participants could take their model home with them in a small paper bag - this make and take home approach appeared particularly effective.

Figure 13: left – photographs of clay models, decorated with components representing air pollution. Right – participants engaging with activities.

The Environmental Health Atlas activity (see figure 14) was predominantly used for engaging adults/parents who wanted to know more about the research. Participants were invited to enter the postcode into the website to see both pollutant and health outcome maps for their area. This facilitated discussion about the impact of pollutants. This activity benefitted from being customisable to participant's local area (also allowing comparisons to other areas).

Figure 14: left – example of NO2 pollutant data map from the Environmental Health Atlas. Right – Environmental Health Atlas running live on iPad for participants to engage with.

The final activity of the stand encouraged participants to consider what kind of scientist they might like to be. This was based on the Ada Lovelace Day campaign poster 'What Kind of Scientist Could I Be?', itself based on research by the Science Council (see figure 15). The intention was that the activity would encourage children to consider themselves as a scientist in that moment, reinforcing the message of the stand, as well as illustrating the wide-range of career paths and options (i.e. not just wearing white lab coats). However, this activity didn't work particularly well with the age-range being attracted to the stand.

While the activities were generally well received, it was noted that the general age of children participating was lower than the 8-12-year-old target demographic, more typically 4-9 years old. While this was not a major problem (many parents were engaged) this activity, which involved
reading text/interpreting a wide-range of roles, was too complex for younger participants. This activity was demoted during the weekend. Overall, just 49 (of the 217) children used this activity.

Figure 15: original poster “What Kind of Scientist Could I Be?” from the Ada Lovelace Day campaign,\textsuperscript{17} also delivered as a printed handout to participants.

One volunteer noted that some participants returned on the second day, and that the stand could be improved by having different activities for each day:

"[The stand could be improved by] another activity, as individuals came back a second day and the activities were the same as the first day."

Summary: having more than one activity improved the engagement experience, by giving participants choice. Having different levels of activities allowed interested adults to find out more about the underlying research. Allowing participants to take home a souvenir from the activity was well received. The online health atlas allowed people to look at data specific to their local area, making the activity potentially more engaging. The activities offered had to be tuned on the day, as the children engaged were slightly younger than anticipated.
Interaction with participants

The phrases used to initially engage people appeared to influence their likelihood of engaging. Asking people if they wanted to learn more about science, appeared to be less effective than challenging youngsters to ‘blow the biggest bubble’, or highlighting the range of free activities available. The exception appeared to be families, who through conversation were found to have existing links to science (i.e. high science capital), where mentioning science directly had a stronger impact.

Several engagement approaches were also trialled. Initially one volunteer was assigned to each family. They would engage a family then lead the child through an activity while simultaneously talking to the parents. However, this was particularly challenging, as volunteers must switch rapidly between addressing the child and adults. A better approach was to assign two volunteers to each family. While the child is lead through the activity by one volunteer, another would talk to parents to explain the purpose of the activity and handout resources. This strategy allowed each volunteer to deliver clearer messaging, and was easier to execute.

While initially it was attempted to tailor handouts to specific people (assembling a bag of relevant leaflets), this proved to be too complicated to do quickly during the event. Instead packs of relevant information were pre-assembled and given to parents. Where appropriate, specific resources were highlighted. For example, where parents of girls were engaged, the conversation included specific reference to the WISE campaign’s ‘People like me’ leaflet, which is aimed at encouraging girls to study STEM subjects.

Summary: the choice of language and style of approach appeared to impact participants’ choice to engage with the activity. Using pairs of volunteers, one to engage the adult, one the child, proved an effective way of communicating different messages to different audiences. Pre-packaging handouts into bags, while highlighting relevant resources to adults, proved a time-effective way of managing busy periods.
People engaged

The project targeted 8-12 year olds, and their parents/guardians in South Somerset. The activity was carried out over the weekend of Sat 28th/Sun 29th July 2018.

Children were tracked by giving them a sticker as they took part in the event. 112 children were reached on day 1 (6-hour period), 105 were reached on day 2 (5.5-hour period), a total of 217. For each child, at least one parent was engaged, and roughly a third of children attended the stand with two parents/guardians, meaning approximately 290 adults were engaged. This is roughly consistent with the number case study role cards that were handed out (~250). Therefore, approximately 500 individuals were engaged over the two days. Most children engaged appeared younger than the project target (8-12 years), roughly 4-9 years. Parents were in the range 25-40 years old. Many grandparents/uncles/aunts of children were also engaged. 49 children were recorded via stickers engaging with the ‘What Kind of Scientist Could I Be?’ activity (see table 1 for the roles selected).

<table>
<thead>
<tr>
<th>Role chosen</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Communicator</td>
<td>1</td>
</tr>
<tr>
<td>The Entrepreneur</td>
<td>1</td>
</tr>
<tr>
<td>The Investigator</td>
<td>10</td>
</tr>
<tr>
<td>The Policy Maker</td>
<td>2</td>
</tr>
<tr>
<td>The Regulator</td>
<td>1</td>
</tr>
<tr>
<td>The Developer</td>
<td>1</td>
</tr>
<tr>
<td>The Explorer</td>
<td>11</td>
</tr>
<tr>
<td>The Service Provider</td>
<td>10</td>
</tr>
<tr>
<td>The Professional</td>
<td>1</td>
</tr>
<tr>
<td>The Teacher</td>
<td>9</td>
</tr>
<tr>
<td>No selected role (ambiguous location)</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>49</strong></td>
</tr>
</tbody>
</table>

Table 1: Table summarising roles chosen by children from ‘What Kind of Scientist Could I Be?’ activity.

An objective of this project was to reach West Country families with low science capital. It wasn't possible to precisely track the jobs of parents/guardians who were engaged, but conversations suggest that the majority were from non-science linked (i.e. low science capital) backgrounds. There were also participants who worked in the local engineering industry, who were broadly aware of the challenges in lack of STEM graduates/apprentices. Of the visitors asked, most came from the local region, but a surprisingly large number were from further afield, including Trowbridge (1-hour travel distance) and Birmingham (4 hours). Often these were extended family members visiting and looking after children who live locally.

**Summary:** 217 children were engaged over two days (11.5 hours), and approximately 300 adults, a total of 500 individuals. Anecdotally most participants lived and worked locally and were from low to medium science capital backgrounds.
Meta-evaluation

Stickers were used to record the number of people engaged (see figure 16). Where participants did not want a sticker, their engagement was still recorded by placing a sticker on the back of a sheet (only five participants declined a sticker). Similarly, different stickers affixed to the ‘What Kind of Scientist Could I Be?’ poster were also tracked.

![Sticker image](image_url)

**Figure 16:** left: sticker handed out to participants. Right: feedback form.

Detailed feedback forms were available for participants to fill out (figure 16), however during the event it was decided that this approach is not appropriate for this environment. Giving feedback of this type becomes a significant proportion of the overall interaction time, which reduces the number of individuals who can be reached, distracts from the primary objective of the project, and potentially adversely influences the participants’ experience of the interaction (busy parents who are not interested in filling out forms while shopping). For future projects (where greater resources are available), it would be worth exploring how dedicated social scientists (those with the proper training and skills in capturing this type of information) could be incorporated into the design of the engagement activity, who could independently survey and monitor participation in the stand.

Volunteers were asked post-event for their feedback using an online survey, and their comments incorporated into this evaluation (see ‘Volunteer Feedback’ below). This proved useful, as it highlighted both good aspects and issues with the stand, as well many potential ideas to improve future iterations. Website analytics could have also formed part of the evaluation process, however with the onset of the General Data Protection Regulation (GDPR) in May 2018, implementing such systems means websites need a full data protection/privacy policy. This is non-trivial and given the limited time available was not incorporated into the site in time. Moving forward, the ability to access in-depth analytics (which can go well beyond visitor numbers, and highlight popular content, approximate visitor geolocation, and how people are finding the content) could add significant value to the project.

**Summary:** stickers provided an easy means of tracking participant numbers. Feedback forms were deemed not appropriate for an event with a relatively short interaction time. Future projects would benefit from incorporating social scientists/relevant people with surveying skills into the project. Website analytics have the potential to provide valuable insight, but raise data protection issues, requiring formal privacy policies.
Costs

The project budget was £2000, and awarded a grant for the full amount. Of this, the total expenditure was £1759.76 (a breakdown is shown in table 2).

<table>
<thead>
<tr>
<th>Category</th>
<th>Counts</th>
<th>Total</th>
<th>Budget</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumables</td>
<td>5</td>
<td>76.75</td>
<td>100.00</td>
<td>-23.25</td>
</tr>
<tr>
<td>Equipment</td>
<td>7</td>
<td>704.24</td>
<td>400.00</td>
<td>+304.24</td>
</tr>
<tr>
<td>Printing</td>
<td>7</td>
<td>257.98</td>
<td>350.00</td>
<td>-92.02</td>
</tr>
<tr>
<td>Subsistence</td>
<td>12</td>
<td>219.32</td>
<td>650.00</td>
<td>+430.68</td>
</tr>
<tr>
<td>Travel</td>
<td>6</td>
<td>447.47</td>
<td>200.00</td>
<td>+247.47</td>
</tr>
<tr>
<td>Website</td>
<td>2</td>
<td>54.00</td>
<td>300.00</td>
<td>-246.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>39</strong></td>
<td><strong>1,759.76</strong></td>
<td><strong>2,000.00</strong></td>
<td><strong>-240.24</strong></td>
</tr>
</tbody>
</table>

Table 2: Summary of project expenditure (in GBP).

The main differences were in equipment, subsistence, travel and website costs. The equipment cost was greater than anticipated as one of the activities involved purchasing a tablet computer to run the interactive Environmental Health Atlas (~£300). Subsistence costs were significantly lower than anticipated as one volunteer only attended for the first day, and two volunteers stayed with family locally – translating into significant saving on hotel costs. Travel costs were significantly higher due to the car hire cost. Due to business insurance restrictions, only a small number of car hire companies could be considered, restricting the use of more competitive/cheaper options, and doubling the cost of car hire. Website costs were significantly lower as due to time constraints a professional designer couldn't be employed, so this work was completed for free by the project coordinator.

Overall, the project came in under-budget by £240.24. It should be noted that this costing doesn't consider any staff/student time, which was provided for free. As a rough guide, the time taken to complete different elements of the project is estimated in table 3.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of participants</th>
<th>Estimated hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research/Application writing</td>
<td>1</td>
<td>(2×7) = 14</td>
</tr>
<tr>
<td>Project coordination</td>
<td>1</td>
<td>(3×7) = 21</td>
</tr>
<tr>
<td>Creating resources, outreach stand and purchasing equipment</td>
<td>3</td>
<td>(7×7) = 49</td>
</tr>
<tr>
<td>Website construction</td>
<td>1</td>
<td>(3×7) = 21</td>
</tr>
<tr>
<td>Training session</td>
<td>3</td>
<td>(3×1) + 2 = 5</td>
</tr>
<tr>
<td>Event weekend volunteers (incl. setup/pack-up time)</td>
<td>4</td>
<td>(4×7) + (3×7) = 49</td>
</tr>
<tr>
<td>Event weekend loading/unloading/driving</td>
<td>1</td>
<td>(2×2) + (2×4) = 12</td>
</tr>
<tr>
<td>Evaluation and reporting</td>
<td>1</td>
<td>(2×7) = 14</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>185 hours</td>
</tr>
</tbody>
</table>

Table 3: Summary of time consumed by project.
Summary: overall the project underspent by £240.24, thanks to volunteers staying with family locally, reducing the accommodation costs. Travel to the event cost more than anticipated due to business insurance restrictions on car hire. It is estimated that approximately 185 hours of volunteer time was required to run the project. For future events the additional cost of transport should be factored into the budget.
Volunteer feedback

Volunteers (three people, not including the project coordinator) were asked to complete an evaluation form after the event to capture their impressions and thoughts (figure 17) and all responded. The event was well-received, with volunteers either agreeing or strongly-agreeing the event fulfilled its primary objective. All volunteers said they would consider taking part in a similar event again.

![Figure 17: Screenshot of feedback form sent to participants.](image)

Specific comments about the activities have been incorporated into the relevant sections above. With regard to project coordination, the one volunteer who attended the training event appreciated meeting with an engagement expert, and also the incorporation of their own research into the planned activities:

‘It was great being involved in some of the planning and being able to incorporate an activity based on my work.’

One volunteer commented that it was challenging interacting with parents, and this could be improved by more preparation. Also, increasing the number of volunteers would help reduce the workload across the both days:

‘A few more people helping on the stand would have helped as we could have had shorter shifts on the stall and therefore be more refreshed.’

**Summary:** generally, volunteers felt the project met its primary objective; the stand location in store could be improved, as was getting parents to stop at the stand after finishing their shop; and a greater number of volunteers on the day would have helped reduce the workload.
Appendix A: email to supermarkets

Dear Sir or Madam,

Please find below details of a community engagement project, led by a leading-London university, which we would like to run over the course of one weekend in the [supermarket branch name] branch in Somerset.

The project is called 'Science in Somerset Supermarkets', and takes the form of an engagement stand, staffed by active scientists with links to Somerset. The key purpose of the campaign is to promote studying science, technology, engineering and medicine (STEM) to young families. This project is focusing particularly on the South Somerset area, which is under-represented in the higher education student population.

The project is being run by researchers from Imperial College London, a world-class university based in central London and exempt charity, and funded by the university’s Societal Engagement Seed Fund.

The request is to run a stand (2 x trestle tables with roller banner-style backings) inside the entrance way of the [supermarket branch name], over one weekend (Saturday daytime/Sunday daytime), ideally on the weekend of June 16th/17th 2018. The stand would be staffed by scientists (a mixture of students and staff) trained in public engagement, and would feature a range of different interactive demonstrations (for example, playdough that children can use to explore what different types of living cells look like). The stand would share information on different options for accessing higher education, and case studies from scientists originally from the Somerset area.

From [supermarket], we would be asking for space to run the stand, and ideally (but not essential) a power connection and/or two trestle tables. In return we would be offering a fun, family-friendly engagement event in store, which is tailored specifically to the local Somerset community. We plan to advertise the project widely with the local media in the run up to the event.

Please let me know if this would be possible, and how best to proceed.

Yours sincerely,

Stuart Higgins

------------------------------------------------------------------
Dr Stuart G. Higgins, Research Associate
Department of Materials, Imperial College London
http://www.imperial.ac.uk/people/stuart.higgins
Appendix B: email to potential volunteers

Dear [name],

I'm writing to invite you to take part in an Imperial public engagement initiative, aiming to reach young people in the south-west of England.

I'm a postdoc in the Department of Materials, originally from Somerset. I have funding from Imperial (via the Societal Engagement Seed Fund) to run 'Science in the Supermarket', which will be an outreach stand based in a supermarket over the course of one weekend in June/July. I'm targeting 8-12 year-old state-school pupils in Somerset, who are under-represented both generally in higher-education and in the Imperial student body.

I'm looking for volunteers from a state-school and south-west background, to either help run the stand, or provide case studies we can include with materials handed out on the day and shared via the project website. I found your profile via LinkedIn, and was wondering whether you'd be interested in being involved?

Look forward to hearing from you.

Best wishes,
Stuart

Dr Stuart G. Higgins, Research Associate
Department of Materials, Imperial College London
http://www.imperial.ac.uk/people/stuart.higgins
Appendix C: email to schools advertising event

Dear [name],

I am writing to let you know about a STEM outreach event at the end of this month, that may be of interest to your pupils and their families.

Over the weekend of 28th/29th July 2018, shoppers at Tesco Yeovil Extra will be able to meet scientists and researchers, blow bubbles to learn about cells, and make models of lungs to learn about air pollution, as part of a new initiative called ‘Science in the Supermarket’.

I am a scientist at Imperial College London, who went to school in Crewkerne, Somerset, and am coordinating a university-funded project to encourage young people, specifically from the West Country, to study science and engineering.

The stand will feature fun demonstrations for young people, and is primarily aimed at 8-12 year olds (but will be relevant to all ages). We will be sharing lots of information for parents and guardians about the wide-range of career opportunities that studying STEM subjects can bring (not just becoming a scientist).

There is an accompanying project website, which includes a links to useful resources, including a map of places to visit around the West Country that link to STEM learning: http://www.superscience.org.uk.

**Science in the Supermarket**
A two-day outreach event, promoting science and engineering, with activities for kids and information about career options for families.
Location: Tesco Yeovil Extra, Queensway, Huish, Yeovil, BA20 1DL
Dates: Sat July 28th (from midday onwards), Sun July 29th (10 am - 4pm)
http://www.superscience.org.uk

I'd be grateful if you were able to share this information with pupils/parents.

Kind regards,
Stuart Higgins

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Dr Stuart G. Higgins, Research Associate
Department of Materials, Imperial College London
http://www.imperial.ac.uk/people/stuart.higgins
Appendix D: press release for event

**Scientists visit Somerset Supermarket to Inspire Next Generation of West Country Scientists**

Shoppers in Yeovil will get to meet scientists from one of the UK’s top universities to find out about nanoinjecting medicines into cells, and mapping health conditions across the UK.

Scientists from Imperial College London are spending the weekend in a Somerset supermarket to encourage young people to study science, technology, engineering and mathematics (STEM) subjects.

Over the weekend of July 28th/29th 2018, shoppers at Tesco Extra Yeovil will be able to meet scientists and researchers, blow bubbles to learn about cells, and make models of lungs to learn about air pollution, as part of a new initiative called ‘Science in the Supermarket’.

The project is led by Dr Stuart Higgins, a Physicist and Biomedical Engineer at Imperial College London, originally from Crewkerne, Somerset. After discovering that in parts of Somerset, the number of young people going into higher education is well-below the national average, he decided he wanted to make a difference.

Dr Higgins said: “Studying science and engineering opens so many doors for young people – not just becoming a scientist. I was lucky to have amazing teachers at school who inspired me, and I hope by bringing scientists to meet young people in Somerset, we can inspire the next generation.”

The project has created an interactive online map (http://www.superscience.org.uk), featuring places across the West Country that have links to STEM subjects.

The UK is facing a national shortage of STEM-trained individuals, for example producing an estimated 20,000 fewer engineering graduates, and 25,000 fewer engineering apprentices, each year than needed. Visitors to the stand can find out more about different university and vocational routes for studying STEM subjects, and the career benefits they can bring.

‘Science in the Supermarket’ is funded by Imperial College London’s Societal Engagement Seed Fund, which supports staff and students to pilot new types of engagement activity.

Dr Amy Seakins, Engagement Coordinator at Imperial College London, said: “The seed fund aims to help people try out new ideas for engaging the public with their research, whether that’s piloting a new approach to engagement, trying to reach a new audience, or working with a collaborator for the first time. We are really excited about ‘Science in the Supermarket’ and its potential to engage members of the public in conversations with researchers, all in a setting where they might not be expecting it!”

Imperial College London is the only UK university to focus entirely on science, engineering, medicine and business, and is consistently rated in the top 10 universities worldwide.

For more information contact Dr Stuart Higgins: stuart.higgins@imperial.ac.uk
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http://www.superscience.org.uk