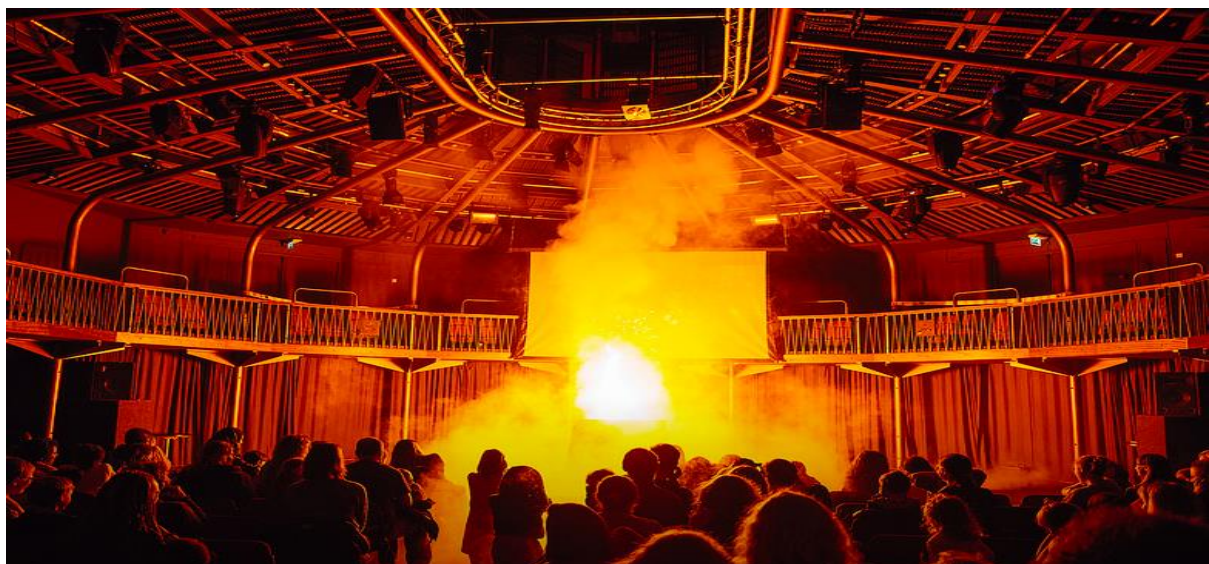


# SMASHFestUK 2017

## Evaluation report

Evaluation of the Supervolcano 2017  
Free arts-science festival



Deptford February 13<sup>th</sup> - 17<sup>th</sup> 2017-03-23  
Locations: Deptford Lounge and The Albany, Deptford

Evaluation Report by Dr. Natasha Simons.  
March-April 2017

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## Introduction



SmashFestUK are a science and arts based organisation that hold an annual immersive science and arts festival for young people and families located in a socio-economically deprived area in South London during February half term. The organisation use an innovative immersive theme-based model to structure science and arts events that follow a narrative theme. The theme in 2017 was Supervolcano!

*“Unbeknownst to Deptford a Supervolcano is bubbling under Lewisham and things are going to get HOT! SMASHfestUK explores how to survive when the world explodes and is covered in ash. Come along and help us use science and creativity to solve this catastrophic problem!”*

(SMASHFestUK Leaflet)

People living in deprived communities and people from minority ethnic communities in the UK have been evidenced to have restricted access to STEM which can prevent young people from these groups pursuing STEM options at school and beyond<sup>1</sup>. These groups also have been evidenced to have lower science capital indicators than those living in wealthier areas<sup>2</sup>. Research has shown that there are wider national issues surrounding the public understanding of science (Miller 2001), a decline in enthusiasm for science (BIS Government report 2009) and a decrease in university uptake in core science subjects (Oon and Subremaniam 2010). Moreover, the representation of women in the STEM workforce is less than 16% (and only 8% for the engineering workforce) (Fidler, 2015).

The SMASHfest event is designed to widen participation in Science, Technology, Engineering and Maths subjects within diverse communities and to increase science capital within these communities. The event is free (although a pay-as-you-can option is in place for theatre

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<sup>1</sup> Fidler, P. (2015) 'STEM Careers: The national perspective' paper from the UK Association of Science Discovery Centres, Bristol 2015

<sup>2</sup> Archer, Dawson, DeWitt et al (2015) 'Science Capital': A Conceptual, Methodological, and Empirical Argument for Extending Bourdieusian Notions of Capital Beyond the Arts in Journal of research in science teaching, Vol 52, 7, pp 992-948

performances) and located across two community venues in Deptford, South London. Events included science comedy, theatre, performance, art, storytelling, artificial intelligence computers, interactive experiments and games, geological street tours, maths and engineering structures and street performers (musicians and science busking). In addition, representatives from industry, universities, museums and colleges were in attendance to engage the public in dialogue about their research, impart knowledge and break down barriers for inclusion.

Furthermore, SMASHFestUK engage hard-to-reach teenage audiences by recruiting volunteers and young explainers from local schools and community groups and provides them with public engagement and safeguarding training (specific to STEM for the young explainers). This increases access, builds confidence in and knowledge about STEM subjects, and encourages networking between the young volunteers and STEM professionals from industry, academia and the creative field.

This report presents the findings of the evaluation of SMASHFestUK's free Supervolcano arts-science fusion festival that took place across two locations in Deptford, South London over February half-term 2017.

The aim of the evaluation was to gain a comprehensive view of how the festival was received by its users and establish the impact that it had on its key stakeholders. Particular focus was placed on assessing the extent to which the festival could impact on increasing access to STEM for the local population and how this access impacted on their overall science capital.

## Aims and Objectives

The aims and objectives of SMASHFestUK are as follows,

- To produce an immersive science and arts festival with a strong narrative theme; engaging hard-to-reach audiences with STEM (young people, BAME communities, deprived areas)
- Build a community of science communicators, scientists, performers, audience members initiated in SMASHFest2015
- Grow relationships with scientific and cultural institutions already partnered with to bring them to local communities
- Research and reduce access barriers to STEM with a hyperlocal approach
- Engage more local young people as facilitators/ambassadors (than in 2016)
- Deepen relationships with Deptford audiences nurtured in SMASHFest 2017 (repeat visitors)
- Increase the science capital and cultural capital of young people in Deptford.
- To bridge the gap between arts and science.
- To bridge gap between science and relevance to life (using real-life situations)

## Research methods

The evaluation utilized front-end and summative methods that were able to both capture quantitative comparative data whilst allowing for qualitative reflection. The evaluation encompassed four principle groups using the following methods,

1. **Group 1:** The adult and child visitors to SMASHFestUK 2017  
**Method:** an in-depth researcher-administered exit questionnaire (closed and open-ended questions) for adults and a shorter form for children (encompassing visuals)
2. **Group 2:** The local young people who volunteered as helpers or young explainers  
**Method:** Pre- and post-comparative questionnaire (closed and open questions)
3. **Group 3:** The science/arts contributors who presented at the festival  
**Method:** A post-event on-line survey.
4. **Group 4:** The school outreach workshops (x3)  
**Method:** teacher and pupil summative evaluation forms

The evaluation was successful in collecting outcome, output and impact data from all the key stakeholders of the SMASHFestUK events (appendix A provides further details of the evaluation methods).

## Sample Group (evaluation)

Type	Adult surveys		% of total visitors	
	Deptford Lounge	The Albany	Total	% of total visitors/family groups
<b>Adult visitor surveys</b>	27	66	93	9%/11%
<b>Child visitor surveys</b>	17	34	51	4%/6%
<b>Total</b>	44	100	144	5%/16%

Type	Sample	% of total
<b>Volunteers</b>	Post - 2	10%
<b>Explainers</b>	Pre - 19 (YE) = 32 (RAE) Post - tbc.	82% (pre)
<b>Contributors</b>	14	35%
<b>School children (outreach)</b>	249	7%
<b>School teachers (outreach)</b>	9	80%

## Locations



SMASHFestUK 2017 was located across two sites in Deptford town centre. The Deptford Lounge hosted six volcano and survival-based activities across the five days of the February half term. The Deptford Lounge is a well-known community venue that is open and accessible to the local population of Deptford. The SMASHFestUK 2017 activities drew in an additional 32% of visitors to the Deptford Lounge across the week. Robert Condon, staff member at the Deptford Lounge, commented,

*“SMASHFest was absolutely brilliant! It is hands-down the best thing that I have seen in the library so far. It certainly brought in lots of interest and people to the library. The whole event was well thought out and appealed to children (and adults) of all ages”*



The Albany is a community theatre venue, café and activity space. It hosted SMASHFestUK 2017 principle festival on Thursday and Friday of February half term. This consisted of 16

performances/shows, 7 targeted activities across the red, yellow and blue rooms, 10 outdoor activities (including the survival village and super volcano) and 3 drop-in activities in the café space. In addition, outside roving performers and musicians attracted and entertained the crowds. The staff at the Albany were enthusiastic about the event and commented,

*“It is always a pleasure to have SMASHfest with us in the building, the team and the performers bring a real sense of vitality and creativity to us. It is interesting for us to work with science based people, as the majority of our interactions are very much with people working in the arts industry. The events are enjoyed by the majority of people who attend, and this is reflected in the conversations we have with attendees, e.g. one woman came to Box Office at the end of the day and donated £50 because her family had enjoyed it so much”* (Polly Cotran, The Albany)

The Albany also thought that the event had helped to promote their venue to audiences outside of the local area who do not normally visit The Albany (postcode data below shows that 14% of the visitors hailed from other London boroughs and areas outside of London).

## Outputs

**2676 visitors** attended SMASHFestUK 2017 an **increase of 41%** from 2016

**30 Young explainers** were recruited from local schools, colleges and youth groups and trained in public engagement and safeguarding. **50% increase** from 2016.

**32 apprentice engineers** from the Royal Academy of Engineers were recruited and trained in public engagement and were able to support participating academics, industry outreach workers, artists and performers in delivering high-quality public engagement . **100% increase** from 2016.

**20 volunteers** were recruited to support the operational team and engage with the public.

**3276 children** were engaged in SMASHFestUK **outreach workshops** across **12 primary schools** in the Lewisham and Deptford areas.

**10 universities** were involved in planning and delivering STEM engagement (Middlesex, Greenwich, Goldsmiths, OU, UCL, Sheffield, Birmingham, Imperial, The University of South Wales and Kings College)

**4 museums** contributed to the event (National Maritime, Royal Observatory, Horniman and Science Museum)

**58 researchers** from academic backgrounds and industry participated in planning and delivering events for SMASHFestUK 2017 (15 were trained in public engagement by SMASHFestUK prior to the festival).



**46 activities** were provided across the two venues (including kid’s comedy club, science theatre, rap and folk smash-up, a specially commissioned play ‘Rupture’, Escape the Volcano live maze adventure, a virtual reality volcano experience, make a volcano, volcano stories, volcano graffiti, spectroscopy in a suitcase, map making, robot rescue, Neon mountain animation, volcanologists, microbe spotting, den building, first-aid volcano survival centre, water purification challenge and biomass fuels, Maths and engineering structures and samba band, science buskers, a stone explorer walking tour and more).

**1 record-breaking super-volcano!** 60,000 watched our world record attempt on-line and over 110,000 connected through online activity in total.

**Built participation** and developed relationships with a diverse and rich range of stakeholders (Including: GLYPT, The Lewisham Young Advisors Group, Equality Lewisham, Lewisham Young Mayors Office, Stephen Lawrence Centre. Lewisham Arts Education Network).

**Over 6000 individuals** had **SMASHFestUK experiences in 2017**. **80%** of these were **local to the Deptford/Lewisham area**.

### Total visitor figures

The total visitor figures were calculated using two tally-counters at the reception of each venue<sup>3</sup>. These counted the total number of adults and total number of children who entered. In the Deptford Lounge, many adult visitors were using the café or library services and in these instances these adults were not included in the tally count. The total visitor figures are presented below,

Day	Deptford Lounge (5 days)	The Albany (2 days)
Adults	335	906
Children	492	943
<b>TOTAL</b>	<b>827</b>	<b>1849</b>

The estimated **total** number of **visitors to SMASHFestUK 2017** is **2676** (+ or - 20)

Based on this data, this year’s figures show an increase of 778 visitors, equivalent of a **41% increase**, from last year (note: last year, figures were calculated from ticket sales at the Albany and a tally count at the Deptford Lounge.).

This year (and last year), the Deptford Lounge recorded **a third more** visitors during February half-term than usual (+32% increase). The staff were confident that this was a direct result of the SMASHFestUK 2017 activities situated in the library.

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<sup>3</sup> It is likely that the tally counters will not have 100% accurately recorded the visitors in and out of the venues (some visitors re-enter several times and others come in clustered groups that are difficult to count accurately). Monday at the Deptford Lounge was not recorded and therefore an average visitor number has been used for this day. To account for inaccuracy, the total visitor number is presented as + or - 20.

# Results



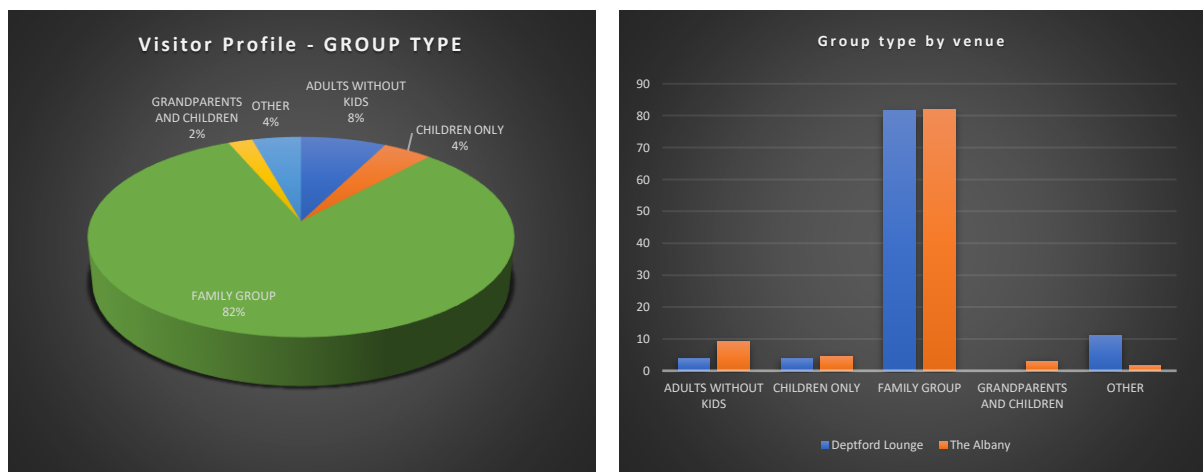
## Visitor Profile

### Key points:

- Most visitors came to SMASHFestUK 2017 as part of a **family group**.
- The average family consisted of **one adult and two children**
- The adult visitors were disproportionately **female**
- There were more **female children** in attendance than male children
- The average age of an adult visitor was between **36-45 years old**
- The average age of a child visitor was between **7-9 years old**
- The majority of visitors were **local to the Deptford area** (or surrounding postal areas)

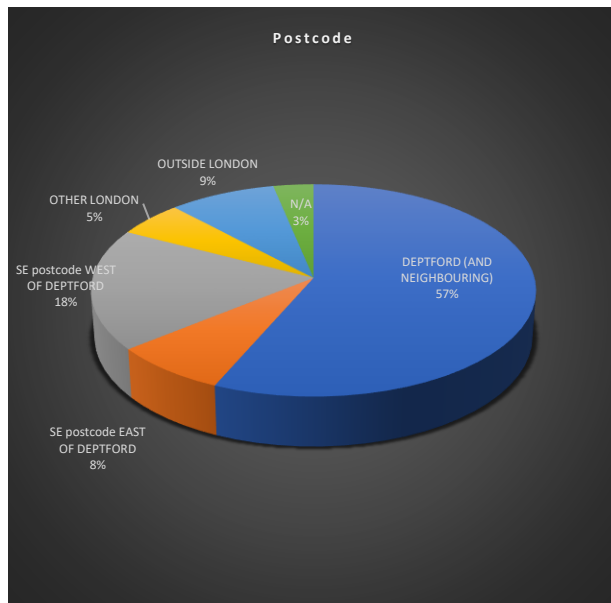
## Group Type

82% of visitors to SMASHFestUK 2017 came as part of a family group. Group make-up was not significantly different for either venue. The Deptford Lounge attracted slightly more holiday clubs/children's groups than The Albany.



The SMASHFestUK 2017 festival was designed and planned to attract family groups. Its marketing strategy, incorporating local schools, reflects this aim. The activities and performances were designed for family groups (targeting all ages from child to adult). SMASHFestUK were therefore successful in attracting the family group as its main visiting group in both venues.

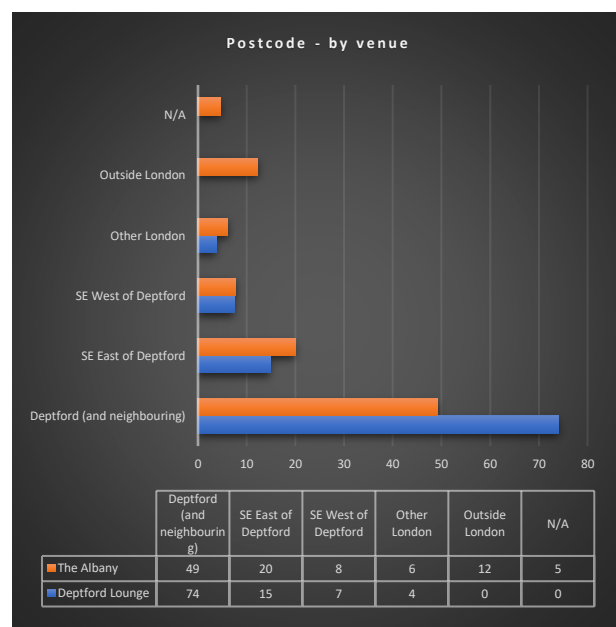
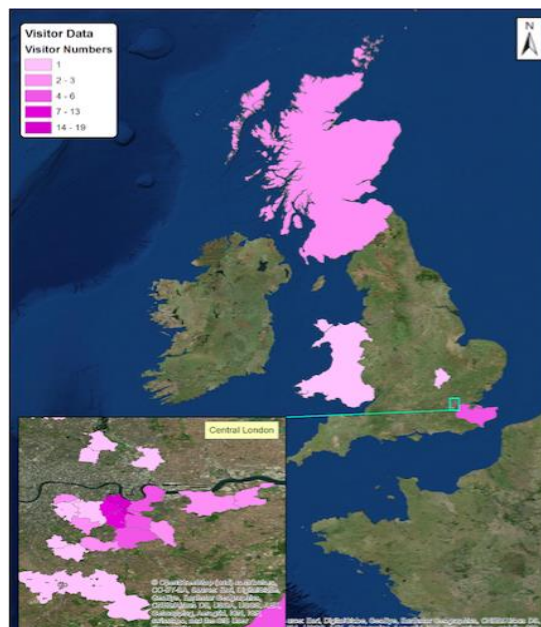
## Postcode data



Postcode (area code)	%	Postcode (area code)	%
SE8	21%	KENT	3%
SE4	14%	SE2	2%
SE14	12%	SE17	2%
SE6	7%	SE18	2%
SE10	5%	SE22	2%
SE13	4%	SCOTLAND	2%
SE26	3%	N/A	3%
SE12	3%		

All other postal areas represented 1% respectively, these included SE5, SE15, SE19, SE27, E5, E8, E15, CR0, N22, Rochester, Bedfordshire and Penarth (Wales).

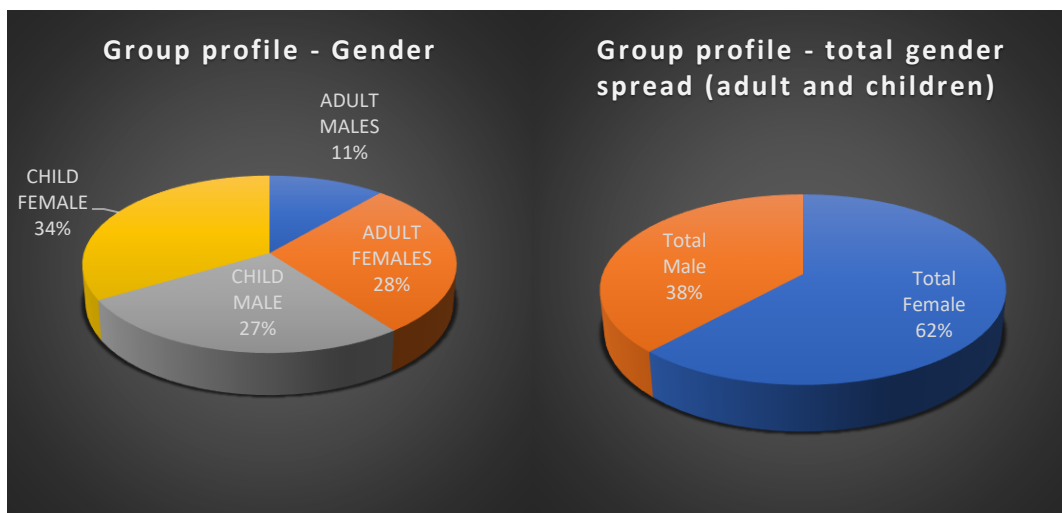
The data shows that the respondents to the survey lived in or in the surrounding postal areas to the Deptford postal area (SE8). The next largest visiting groups hailed from the postal areas west of Deptford. Comparatively few visitors came from the postal regions further East from Deptford and its immediate surrounding postal areas. Some visitors travelled from North and East London postcodes to attend the events. 9% of respondents came from outside of London (as far away as Scotland and Wales), see heat-map below,



A breakdown of the data shows that the Deptford lounge drew more visitors from the local vicinity than The Albany venue. This reflects the locality of The Deptford Lounge and its general regular use by the local population. Many of the visitors to the Deptford Lounge may have combined their visit with a trip to the Library.

## Visitor profile - age and gender

The respondents were asked to list the total number of male or female adults and children in their visiting group and the gender of each member of the group. The aim was to gather a more accurate picture of the demographics of the visiting groups.

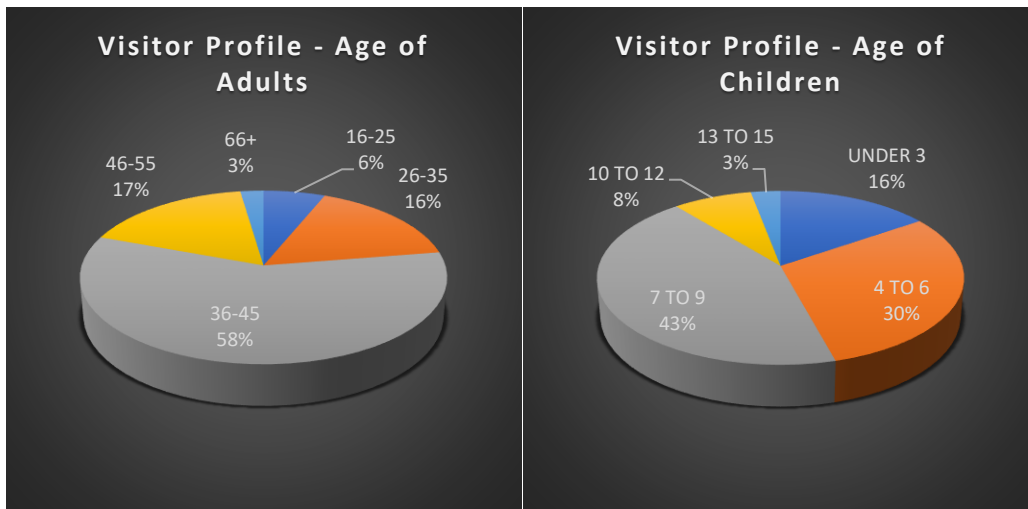


39% of the visiting groups were made up of adults and 61% children. The average group size consisted of one adult and two children<sup>4</sup>. The festival attracted an over representation of female adults and children - 62%. This is significant because research has shown that gender identity often plays a significant role in shaping children's attitudes towards science and their science aspirations. Young girls often dismiss STEM subjects as 'not for them' (Archer and DeWitt, 2014) and there has been shown to be an underrepresentation of women in STEM careers (Fidler 2015). The overrepresentation of women and girls at SMASHFestUK, together with a strong presence of female STEM professionals and performers, provides dynamic access point for women and girls to get involved in science/STEM activities and potentially shift attitudes and develop aspirations. Encouraging further intergenerational learning within family groups will strengthen this further.

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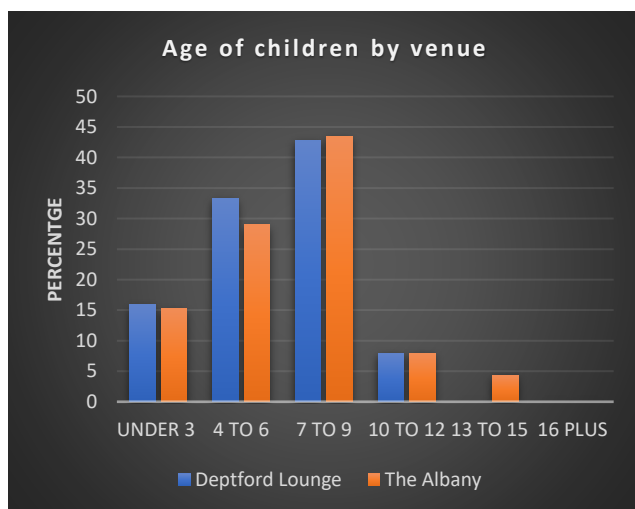
<sup>4</sup> There were over double the number of adult females than adult males in the sample group. There were 7% points more female children than male children in the sample group. The sample group consisted of more female visitors (adult and children) than male visitors (adults and children).

## Age



The average age of adult visitors to SMASHFestUK 2017 was 36-45 years old.

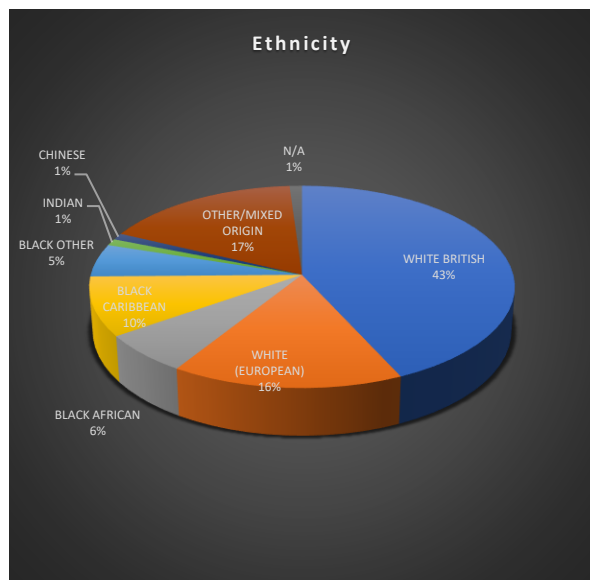
The average age of children visitors to SMASHFestUK 2017 was 7-9 years old. A large percentage (46%) of the children in attendance were under six years old. Nearly all were from pre-school, foundation phase of Primary Key Stage one or two (97%). Only 3% were secondary school age.



The Deptford lounge drew a slightly higher percentage of children six-years old or younger than The Albany (+5 % points).

## Ethnicity

Lewisham is a diverse local authority with a large African and Caribbean community. SMASHFestUK 2017 attracted visitors from all of the ethnic backgrounds present in Lewisham (and Deptford areas).

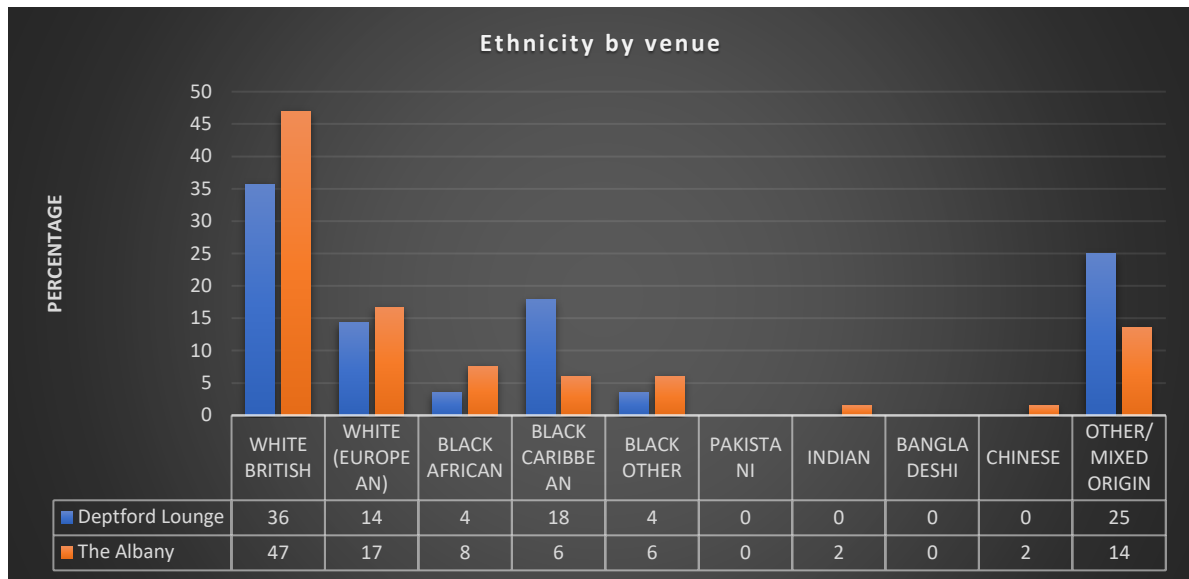


Ethnicity	Government Data for Deptford	SMASHFest data (both venues)	Difference
<b>White British</b>	36%	43%	+7%
<b>White Other</b>	13.9%	16%	+2.1%
<b>Black</b>	28.9%	21%	-7.9%
<b>Asian</b>	10%	1%	-9%
<b>Mixed</b>	7.5%	17%	+9.5%
<b>Other</b>	2.9%	1%	-1.9%

The sample group shows that 43% of the respondents were white British. 21% were black (African, Caribbean or black other). 17% of the respondents were of mixed origin or 'other' (Singapore, Arab, Bolivian) and 16% of the respondents were white European. Very few respondents were from Pakistan, Bangladesh or India (1%).

Data from 2015 (UK polling data - see table above) demonstrates the differences between SMASHFestUK visitors' ethnicity and the ethnic mix of Deptford. This shows that SMASHfestUK attracted a slightly higher proportion of 'White British' and 'White Other' visitors which reflects the draw of visitors to SMASHFestUK from other postal areas surrounding Deptford where the ethnic mix is different. There was a higher proportion of 'mixed heritage' (or 'other') visitors than is normally represented in Deptford's population.

The difference in the SMASHFestUK visitors reflects the number of visitors that attended from other London postal areas and from outside of London (where the ethnic mix will be different to Deptford), however SMASHFestUK succeeded in attracting a wide racial and ethnic mix that broadly represents the local community.

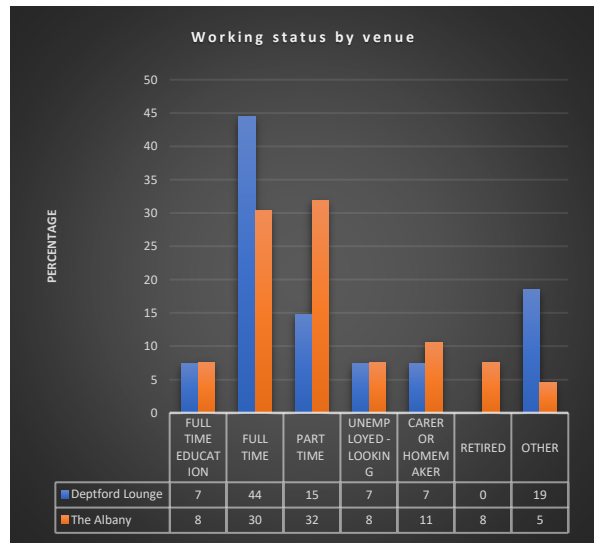
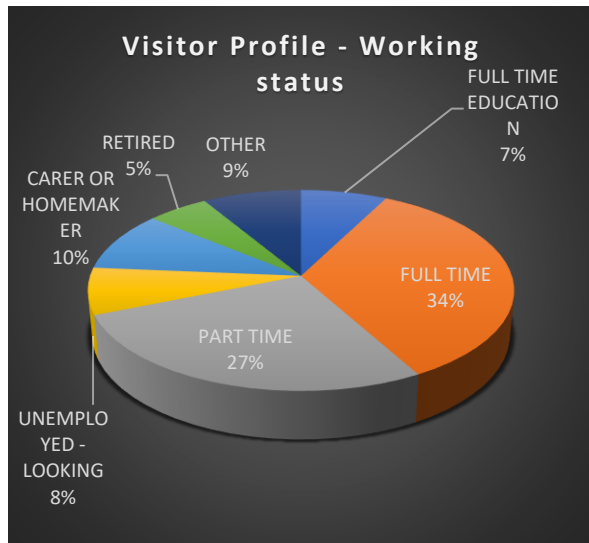


Further analysis demonstrates that the Deptford Lounge attracted a more representative demographic of black (all), 'white British' and 'white other' ethnicities for the Deptford/Lewisham area. The Albany attracted slightly more 'white British' demographic, reflecting of the range of respondents from different postal areas that attended The Albany.

Neither venue attracted a representative demographic from South Asia (India, Pakistan or Bangladesh), although there was a high percentage of mixed origin respondents (some of which may have been from mixed origin Asian backgrounds).



## Working Status



The majority of the respondents are currently in full-time employment (34%) or part-time employment (27%). The 'other' group represented mainly self-employed workers.

These results are in line with official data from Deptford and Lewisham that places 62% of residents in employment (full or part time), 6% unemployed, 6% retired, 11% not working or sick.

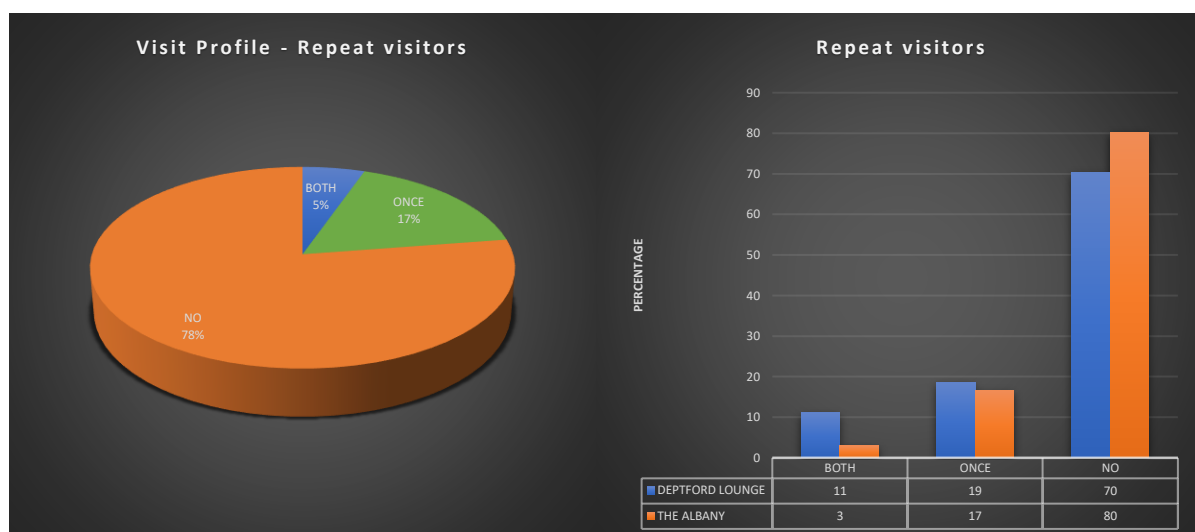
A breakdown of the data shows that The Deptford Lounge attracted a higher percentage of visitors who worked fulltime, and fewer homemakers, retired and part-time workers.



## Visit Profile

The following section explores the visit profile of the 93 respondents who completed the evaluation survey. This provides information on the repeat visitation, motivation to visit, frequency of annual 'science events/activities' and advertising seen.

### Repeat visitors



22% of the respondents had previously been to one or more SMASHFestUK events previously. 17% had been to last year's SMASHFestUK and 5% had visited in 2015 as well.

This was a slight decline in repeat visitors from last year where 30% of the respondents had previously visited SMASHFestUK<sup>5</sup>.

The Deptford Lounge attracted slightly more repeat visitors (who had been to one or both events) than The Albany. This difference may be reflective the number regular repeat visitors that attend the Deptford Lounge during the February Half term (for Library and other activities).

<sup>5</sup> Note: the sample size of adult visitors for the 2016 evaluation was fewer than in 2017 which could skew the percentage calculations.

## Similar events



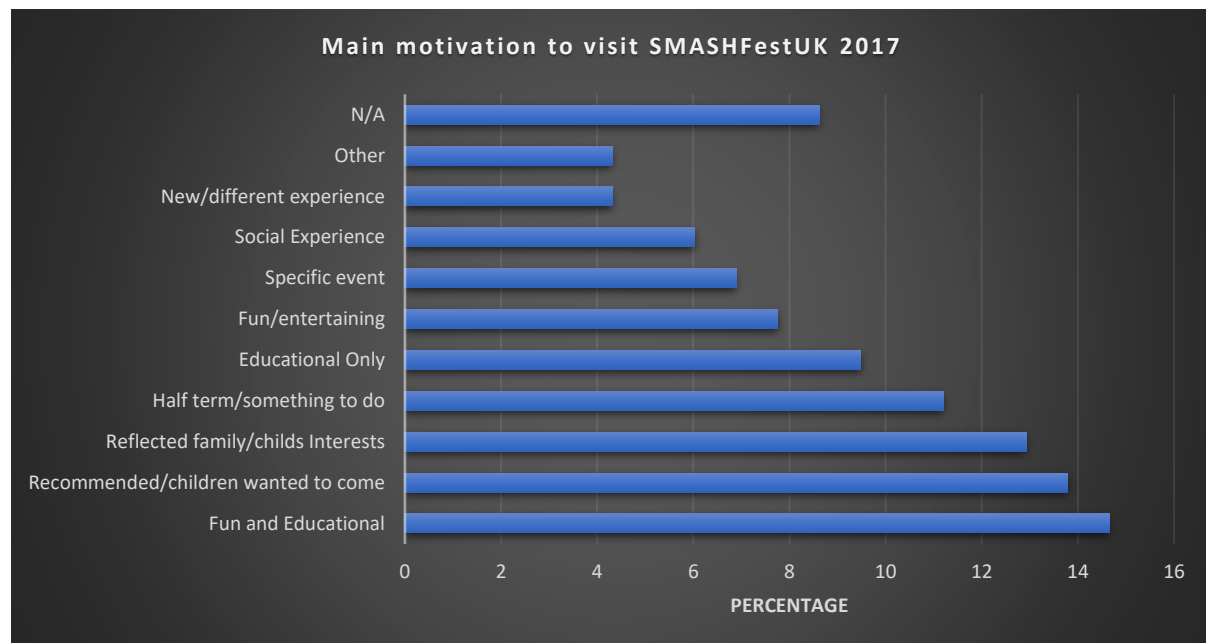
71% of the respondents had not visited an event similar to SMASHFestUK before. This indicates that, for many, SMASHFestUK represents a unique and wholly different experience for them. SMASHFestUK do not use the handle 'science' festival and this has an impact in attracting visitors that may not usually visit such events.

For the 19% who had been to similar events, respondents specified: The Science Museum in London; Underbelly at the South Bank (<http://www.underbelly.co.uk>); Imagine Children's Festival at the South Bank (<https://www.southbankcentre.co.uk/whats-on/festivals-series/imagine-childrens-festival>); Hands-on Science at the Royal Festival Hall; Science Festivals around the country (Edinburgh and others); and other community activities (at The Albany and elsewhere).



## Motivation

The respondents were asked an open-ended question about their motivation to visit SMASHFestUK that day. The responses have been coded and themed in the below chart<sup>6</sup>,



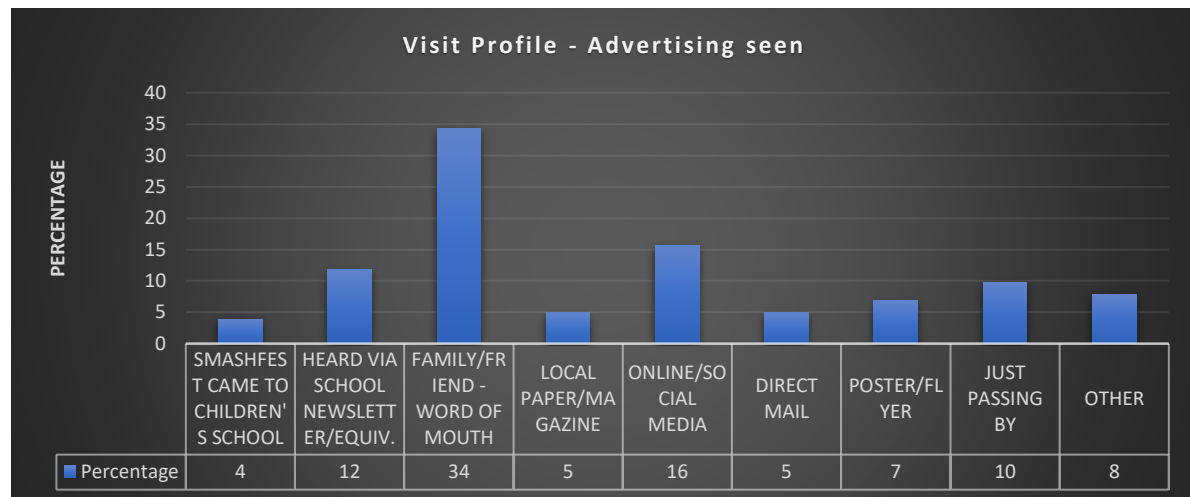
The respondents gave varied reasons for visiting SMASHFestUK 2017. 27% of the respondents felt that the opportunity to engage in educational opportunities was their main motivation (17% of these also combined this with ‘fun’). 16% had SMASHFestUK recommended to them, or they had previously visited, or the children had asked to go. 15% felt that the SMASHFestUK programme of events reflected their children’s or families interests (10% of these were science-related interests and 5% were the combination of arts and science or creative events). 13% were looking for activities to entertain their children during the half-term and 7% were motivated by the opportunities afforded by the event being ‘local and free’. 8% visited because they were attracted by specific shows or activities and 7% because it structured a social experience for family and friends. For those that had not pre-planned their visit, the motivation was that SMASHFestUK provided something different and new (5%).

Prior research into motivations to visit informal learning institutions such as museums and science discovery centres has demonstrated that personal reasons (prior knowledge, expectation, choice and interests and beliefs), physical setting (design, signage, layout, access and facilities) and social factors (social interactions between visiting groups and visitors and staff) are all relevant to participation (Falk and Dierking 2005). Although being a free event can increase access, it can often be cultural, rather than structural, factors that can prevent or encourage participation (Merriman 2000). By working with local communities and schools prior to the event, SMASHFestUK were able to reinforce their presence and break down barriers to inclusion that may have ordinarily prevented some visitors attending.

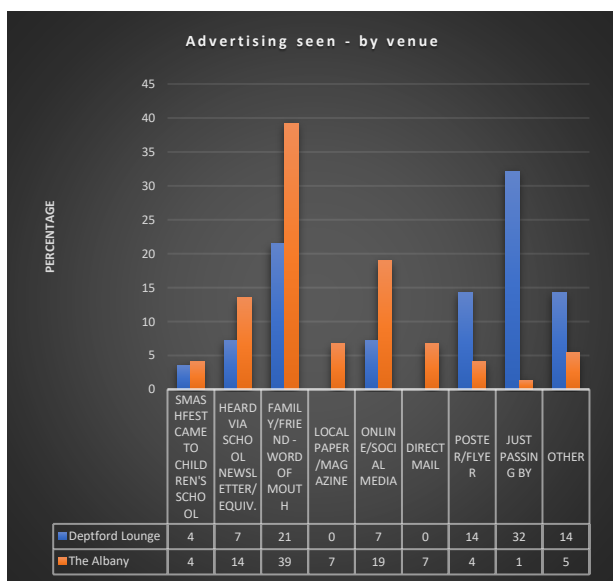
<sup>6</sup> Note: Some respondents gave more than one answer - these have been coded separately.

SMASHFestUK’s strategy of visiting local schools to present outreach and embed knowledge of the festival could be demonstrative of the high percentage of comments that the ‘children wanted to come’. The children’s survey (see below) shows that 39% of the child respondents attended local schools that SMASHFestUK had visited in January.

## Advertising seen



The most effective advertising for SMASHFestUK 2017 was ‘word of mouth’ recommendations (34%). This indicates that SMASHFestUK as a local festival has a strong presence in the community and news about the event is spread verbally. Further analysis shows that the percentage of word-of-mouth recommendations grew throughout the week, culminating in 49% of Fridays respondents citing word of mouth. This suggests that visitors to the event earlier in the week were recommending it to their family and friends. Online advertising was also an effective advertising method with 16% accessing online or social media advertising and 5% having received direct mail advertising (those listed were: The Albany newsletter, Lewisham email newsletter and Lewisham news). The advertising /communications via local primary schools, including those that had been visited by SMASHFestUK, was effective in attracting 16% of the respondents. 10% had not seen any advertising and were just passing by. Other forms of advertising, local paper/magazine (specifically Timeout), and posters/flyers accounted for 12% of the advertising. 17% of the respondents commented (see below - recommendations) that they felt that more advertising for the event was necessary (via schools, local area poster campaign and the council website/Facebook pages).



A breakdown of the data demonstrates that advertising for the events at The Albany were more effective than advertising for the Deptford Lounge, where 32% were passing by and had not seen any advertising (or had only seen a poster up in the Library that day) (14%).

## Science Capital and Informal Science Access

The amount of science capital available to an individual has been connected to both aspiration and educational participation in science. Research has shown that children with high amounts of science capital in their environment are more likely to do well in science at school and pursue a career in a science-related field when they are older (Enterprising Science: Science Capital: a summary for policy makers, 2014, Science capital and the STEMs skills gap, BP<sup>7</sup>). Further studies have shown that levels of science capital (high, medium or low) are influenced by cultural capital, gender and ethnicity (Archer, Dawson, DeWitt et al, 2015). SMASHFestUK 2017 was presented in an area where there is an under-representation of participation in STEM subjects. The area has a high percentage of economically disadvantaged young people, minority ethnic communities (BAME), women and girls, and young people living in poverty<sup>8</sup> (all have been linked to isolation from STEM progression and building science capital).

One of the aims of the evaluation was to establish the relationship that the visitors have with informal science in general, and to explore how far the SMASHFestUK 2017 festival may contribute to improving a families' science capital<sup>9</sup>. Primarily, the respondents were asked how often they, and their families, visited informal science (or science activities outside of school) per year. This data was then coded into:

- 'Non-users' of informal science - never access informal science
- 'moderate' or 'occasional' informal science consumers - visit 1-2 times per year

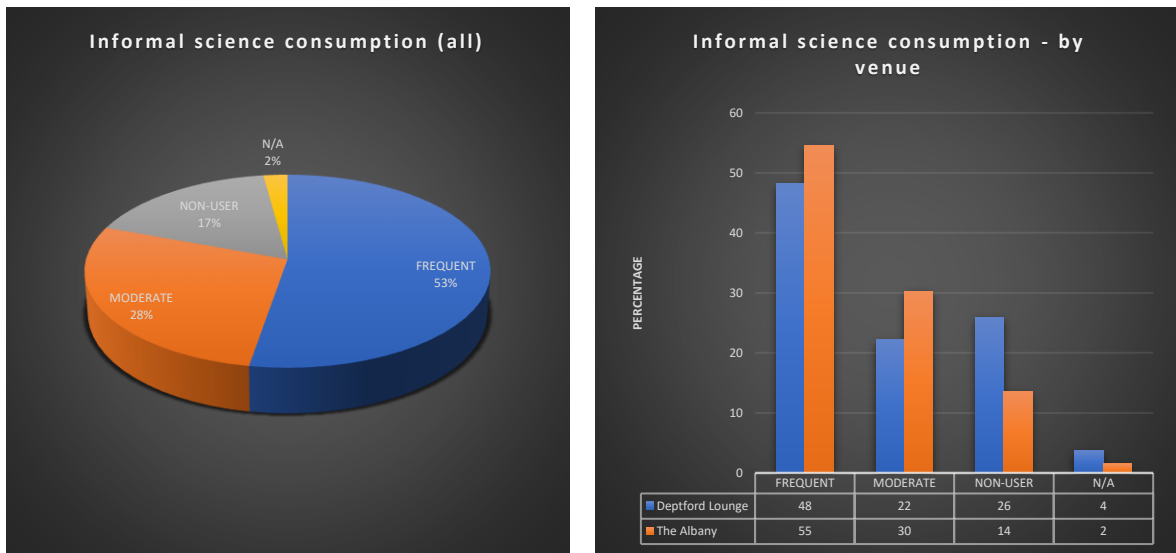
<sup>7</sup> [http://www.bp.com/en\\_gb/united-kingdom/bp-in-the-community/stem-education/stem-skills-gap-science-capital.html](http://www.bp.com/en_gb/united-kingdom/bp-in-the-community/stem-education/stem-skills-gap-science-capital.html)

<sup>8</sup> <http://www.londonpovertyprofile.org.uk/indicators/boroughs/lewisham/>

<sup>9</sup> Science Capital dimensions are: science literacy; science related values, attitudes and dispositions; knowledge about transferability of science (research, careers etc.); science media consumption; participation in out of school science learning contexts; family science skills, knowledge and qualifications; access to people in science-roles; and talking about science in everyday life (Aspires Report, Kings College, 2015).

- ‘frequent’ who access informal science 3+ times per year<sup>10</sup>

The results indicate that most of the respondents were **frequent** consumers of informal science activities (53%), with 16% visiting or accessing informal science over six times per year. However, 17% of the respondents **never** access informal science normally. This indicates that SMASHFestUK provides a vital entry point for informal science for some of its users. The below chart shows the distribution of the frequency of consumption of informal science.



The results show that many of the respondents frequently seek out science-based activities outside of school (at least 3 plus times per year). Of these, most of the respondents listed The Science Museum in London as a place where they access informal science on a regular basis (19 responses). Others listed science festivals, home science parties and other local museums (Greenwich, Horniman and Natural History museum) as places that they might access informal science.

A breakdown of the data demonstrates that the Deptford Lounge was more successful in providing access to non-users and moderate-users of informal science than The Albany. This is reflective of the type of visitor, (especially drop-in users), who might access the Library venue over the theatre venue. A familiar, friendly and open-venue (note: glass walls of the Deptford Lounge) allows visitors to know what is available before entering, a closed venue can put-off non- or infrequent visitors who are unsure what may be behind the walls<sup>11</sup>. The range of activities available (and the learning objectives for each) was more restricted at the Deptford Lounge due to space restrictions (see below). Due to the increased access that The Deptford Lounge provided to non-users and moderate consumers of informal science, further consideration may be needed to ensure activities and levels of learning are sufficiently matched to those at The Albany. There is also an opportunity to create better links and promotion between the two sites that may encourage more non-users and

<sup>10</sup> These three groups are derived from Hood’s article ‘Staying away: Why people choose not to visit museums’ that explores the motivations of non-visitors, occasional and frequent museum goers (Hood, Museum News, 1986).

<sup>11</sup> Spencer H (1991), ‘improving public access to museums’ in Lord and Lord (eds) (1991) The Manual of Heritage planning’. Crown Publishing, London.

moderate users to access The Albany venue too (for example a walking train between the two, treasure hunt<sup>12</sup>).



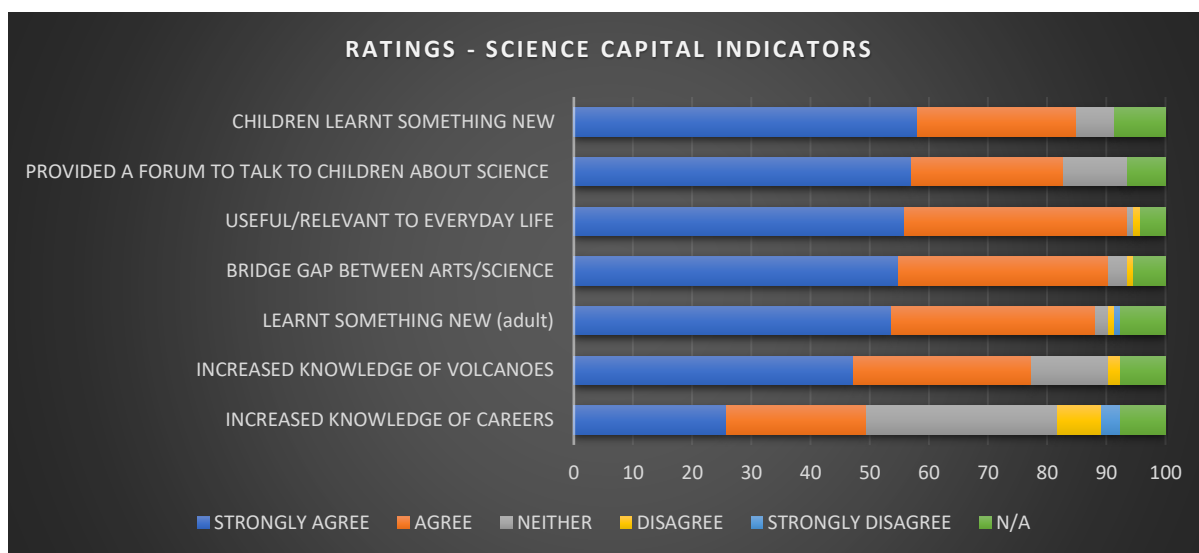
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<sup>12</sup> The Escape the Volcano activity at The Albany did a good job at encouraging participation at both venues by setting the children challenges that linked to the Library venue and the record-breaking super-volcano. The passport was also useful in encouraging participation across venues.



## Science Capital Indicators

The chart below shows how far the adult respondents perceived that SMASHFestUK 2017 fulfilled some of the principle science capital indicators (identified in footnote 9).



The overall results indicate that the respondents were most confident that SMASHFestUK 2017 provided an opportunity for their children to learn something new and that it provided a forum for them to talk to their children about Science (technology, engineering and Maths). These are vitally important in encouraging positive attitudes and aspiration that extends to the whole family. The results are explained below in three sections, ‘perceived learning and knowledge gain’, ‘behaviour and progression’ and ‘aspirations and relevance’.



## Perceived Learning and Knowledge gain

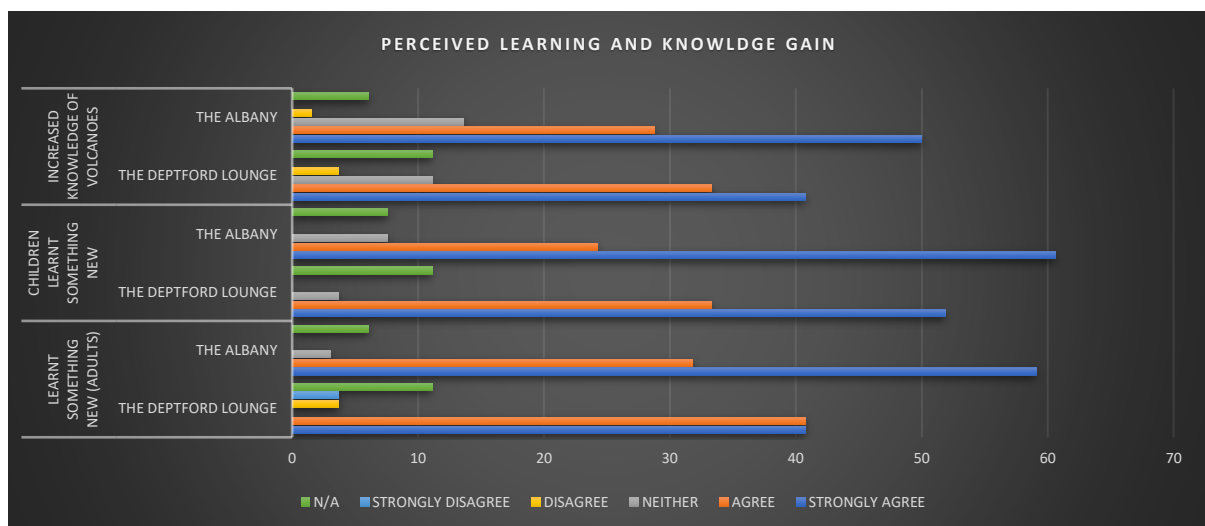
This section will present the results of several questions that were aimed at gaining a better understanding of the adult visitors perceived and actual learning whilst attending SMASHFestUK 2017<sup>13</sup>.

**85%** of the respondents either strongly agreed (57%) or agreed (27%) that during the SMASHFestUK 2017 festival their **children had learnt something new**.

**88%** of the adult respondents either strongly agreed (54%) or agreed (34%) that **they had learnt something new** at SMASHFestUK 2017.

**77%** of the respondents strongly agreed (47%) or agreed (30%) that the festival had **increased their knowledge of volcanoes**.

A breakdown of the results for each venue is presented in the chart below,

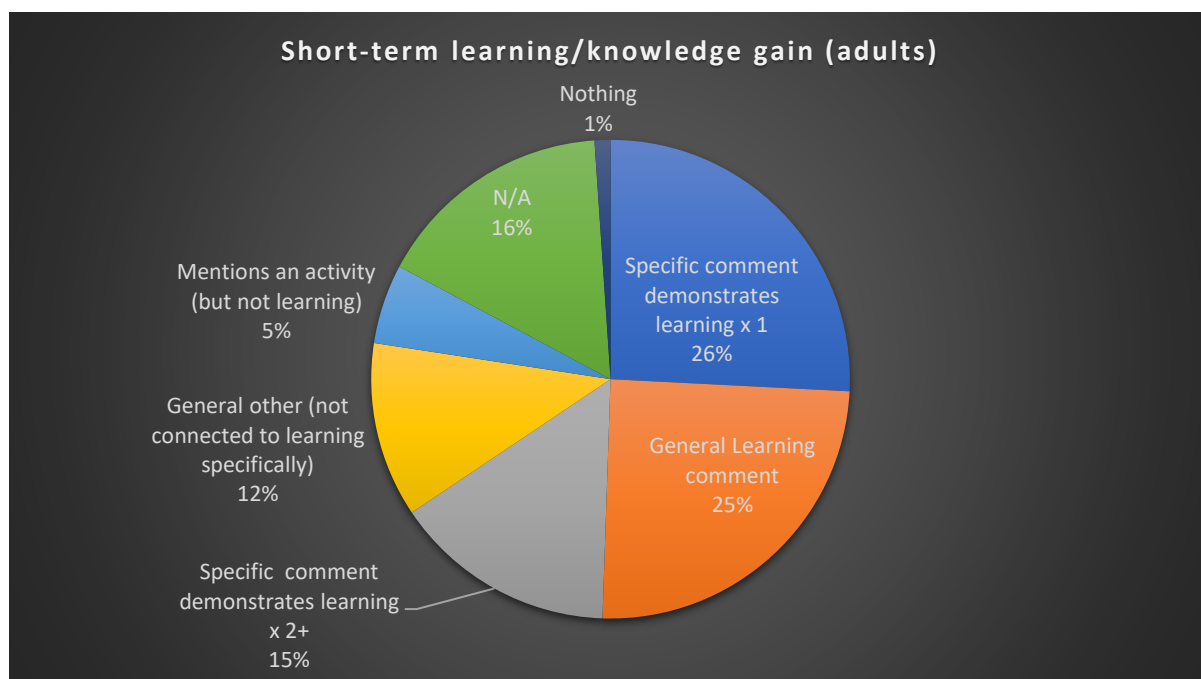


The visitors to the Deptford Lounge were less confident in the learning that occurred at this venue than the visitors to The Albany. The Deptford Lounge had a smaller selection of activities (focused mainly on KS1) and no performances (which may explain the difference in results). However, the activities that were provided at the Deptford lounge were not perceived to provide as sufficient learning opportunities as those at The Albany.

To understand learning that occurred at SMASHFestUK 2017 further, the adult respondents were asked to specify anything new that they had learnt as a result of attending SMASHFestUK 2017. 65% were able to specify some learning that had occurred at SMASHFestUK 2017 and 36% of the adult visitors were able to specify at least one specific piece of science or arts knowledge that they had gained from their experience at SMASHFestUK 2017 (of these 15% were able to state two or more specific areas).

<sup>13</sup> Note: the questions were aimed at assessing short-term learning only.

The chart below demonstrates the comments grouped into specific categories<sup>14</sup>.



There were a number of comments given that demonstrate that the adult visitors had gained new knowledge as a result of their trip to SMASHFestUK 2017. It is increasingly important that adults as well as children are engaged in learning at science festivals, because research has shown that parental positive attitudes towards science and maths directly correlate to their children's success in these subjects<sup>15</sup>. Science capital research has also shown that parents who are able to talk to their children about science regularly at home can increase the science capital of their children. Below are a selection of the examples from the adult visitors of new arts and science knowledge that they learnt,

*I did the immersive Montserrat volcano experience - listening to the kids reveal their volcano stories made me ponder and imagine that I was there. I learned about volcanoes on The Moon, Mars and Venus and*

<sup>14</sup> The categories were determined in the following way:

- Specific comments that demonstrate learning were comments that mention new and specific science or arts related facts and/or new knowledge (i.e. LIQUID NITROGEN EXPANDS BY 700 TIMES WHEN EXPOSED TO WATER). This category was divided into two: one piece of new knowledge shared and two plus pieces of new knowledge shared.
- General learning comments were determined as comments that mentioned learning occurring, but did not give a specific example (i.e. WE LEARNT MORE ABOUT SURVIVAL or WE LEARNT ABOUT VOLCANOES)
- Mentions an activity (but not specific learning) is where the comment given only referred to the activity and not the related learning (i.e. SPRAY PAINTING)

<sup>15</sup> Grace A, Jethro O and Aina F (2012). Roles of parents on the academic performance of elementary schools. International Journal of Academic Research in Business and Social Sciences. January 2012, Vol. 2, No. 1 ISSN: 2222-6990

*pancake volcanoes and how to make instant poetry with mixed random words from the audience.*

(female adult, SE8, Deptford lounge)

*I learnt so much. How to make fire (three things), what temperature water freezes - how to change water into ice with a smash. Using a battery to light a fire ... so much!*

(female adult, SE4, Deptford lounge)

*I learnt that space volcanoes exist! Instead of lava they eject frozen nitrogen and ice!*

(male adult, SE27, the Albany)

*I learnt that that cooled magma makes obsidian.*

(female adult, SE8, the Albany)

*I learnt that volcanoes can be hot or cold in space. How to make a rocket fire. How to turn dirty water into clean water. How to make elephant toothpaste!*

(female adult, SE8, the Albany)

*I learnt that nitrous oxide = > -100 degrees. To filter water, you can use stones then sand then charcoal then cotton wool and then you boil it to make it safe to drink.*

(female adult, SE4, the Albany)

*I learnt in Dr. Death that malaria comes from the French meaning 'bad air'.*

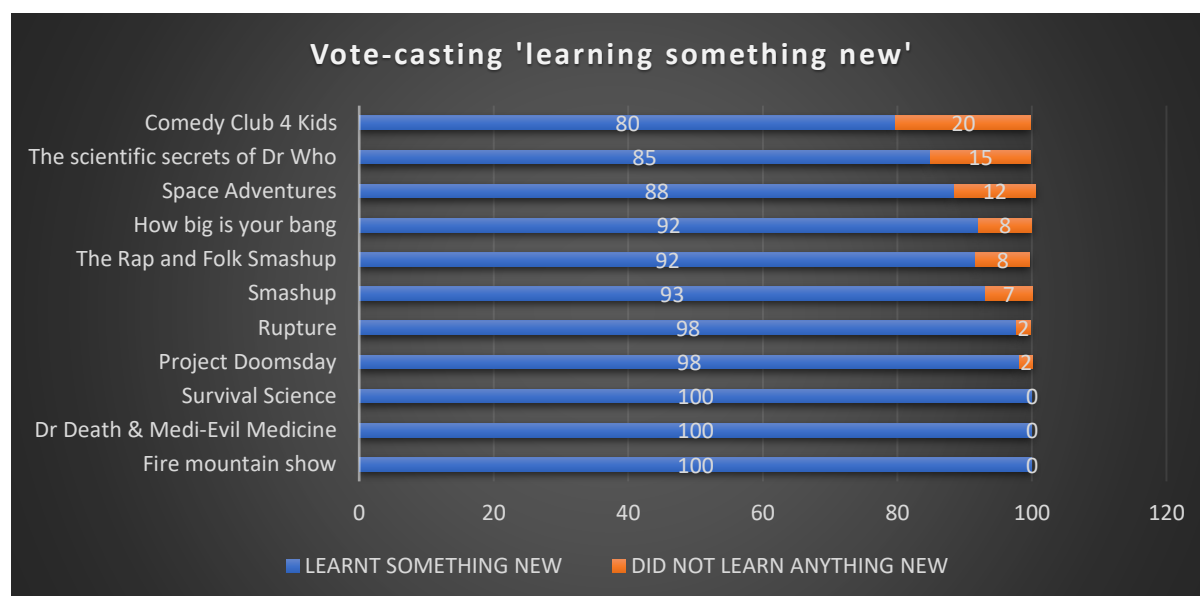
(male adult, SE10, the Albany)

*I learnt that the collapse of liquid nitrogen is needed for an explosion*

(male adult, LU7, The Albany)

The adult respondents were more able to provide examples of new knowledge and learning from their experiences at The Albany venue than the Deptford Lounge. The Albany venue not only provided more access to science and arts activities, it also provided different methods to engage visitors - audio, visual and kinaesthetic. Most of the adults responded to something that they had *heard* (audio) during a show or performance (31 comments) - of these 5 specified information about space volcanoes and 5 specified information that they had learnt about liquid nitrogen. Although both types of engagement were successful in imparting knowledge to adult visitors, fewer adults listed an *activity* that helped them learn new knowledge (17 comments), many of these comments referred to the water purifying demonstration at the survival village (7 comments).

The perception of learning something new was also measured after each of the performances at The Albany (Thursday and Friday), by asking all of the visitors (adult and children) exiting the performances to cast their 'vote' in provided baskets - marked 'I learnt something new' and 'I did not learnt anything new'<sup>16</sup>. The results for these votes are presented in the chart below,



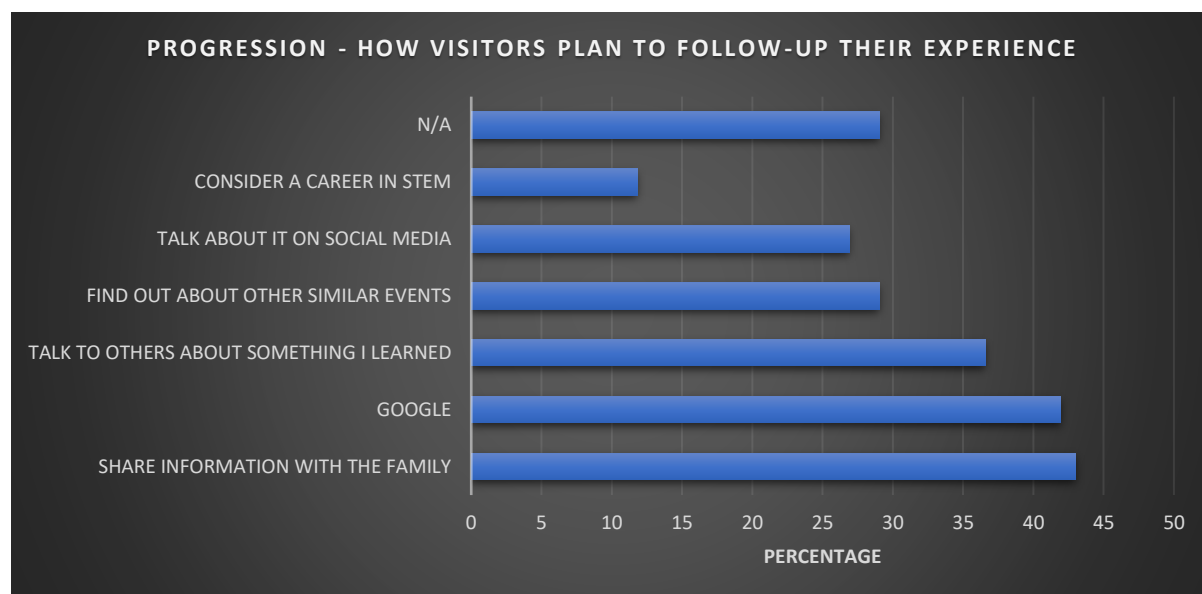
The results show an average of 93% positive affirmation from the exiting audiences that they felt that they had learnt something new as a result of attending the performance (both adults and children). Survival science, Dr. Death and The Fire Mountain show received 100% votes cast for 'I learnt something new'. The Comedy Club 4 Kids gathered the least positive votes - this performance was not specifically designed to impart STEM knowledge, rather to be a good and fun start to the day.



<sup>16</sup> Two of the performances were missed due to timetabling issues, Utterly Amazing Volcanos in Space and Can you Survive? (both in the Red room). This was a fun way to collect quick data, the exiting audiences were asked to throw a ball into the relevant bucket/basket. Some children were seen to grab more than one ball, and others were seen to place balls without consideration. However, overall, it was a successful way to collect quick responses.

## Behaviour and Progression

This section presents to results of the questions relating to how the visitors extend their experience beyond the SMASHFestUK 2017 events. The respondents suggested that they would follow-up the experience of SMASHFestUK 2017 in various ways (from a selection of closed-question options). The options signify either a progression in interest outside of the event itself and/or indicate knowledge transfer from the visitor to others outside of the event (such as family or friends)<sup>17</sup>, both important for developing and nurturing science capital within families.



43% specified that they would share some of the information that they learnt at SMASHFestUK with their family and 37% felt that they would talk to others about something that they had learnt at SMASHFestUK. 42% specified that they would look up further information about something that they learnt on 'Google' (or similar search engines), and 27% thought that they would share or talk about the event on social media. Only 12% felt that the event would encourage them to consider a career in STEM. 29% did not respond to this question (although they did not select the 'nothing' option).

Sharing information (both knowledge learnt and about the event via social media) demonstrates that SMASHFestUK activities were substantial and interesting enough to encourage knowledge transfer between some visitors and other non-visitors and enjoyable enough to want to encourage others to attend. The high percentage of those that might conduct an internet search to explore areas that they found interesting indicates that some visitors are interested in extending their knowledge/interest in subjects that they came across at SMASHFestUK 2017.

<sup>17</sup> Note: this is a perceived progression and a longer-term evaluation post-event was not possible for this evaluation.

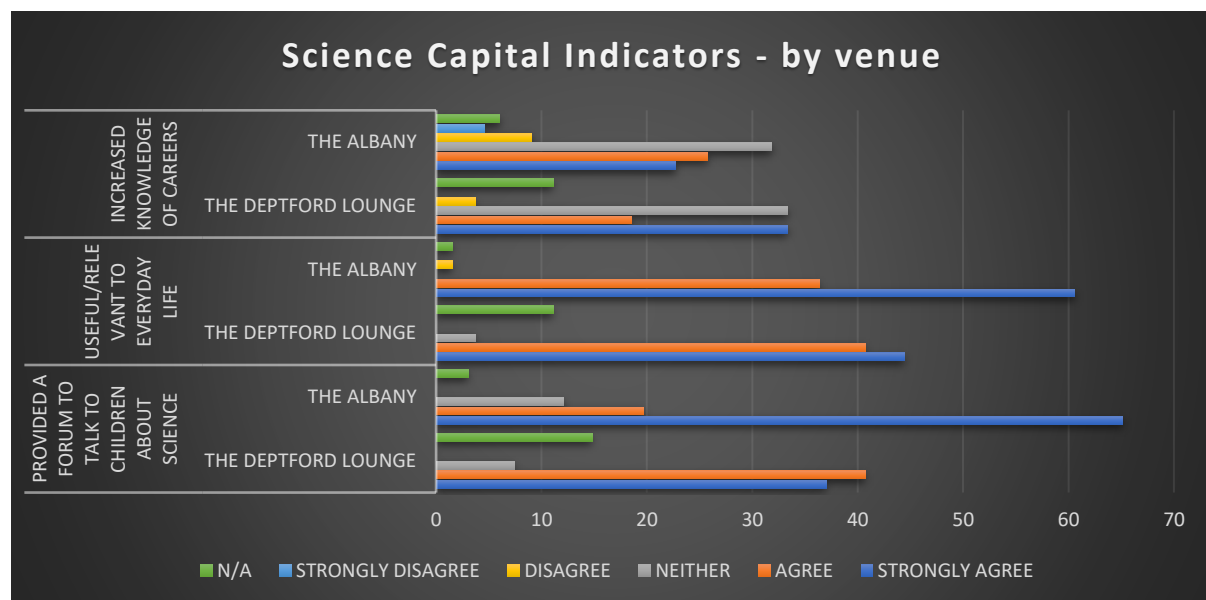
## Aspiration and Relevance

This section explores the questions that were related to understanding the visitor’s aspirations and how far SMASHFestUK 2017 contributed to making STEM subjects relevant to everyday life (for families).

**94%** of the respondents strongly agreed (56%) or agreed (38%) that the **event helped to show how science can be useful or relevant to everyday life**

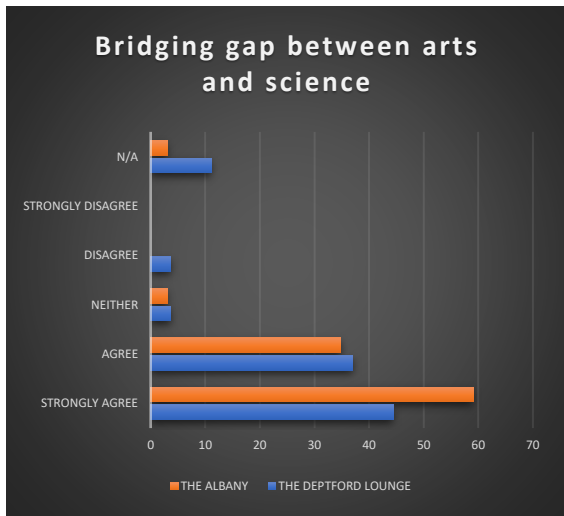
**83%** of the respondents strongly agreed (57%) or agreed (26%) that the event had **provided them with a forum to talk to their children about science**.

Only **50%** strongly agreed or agreed that SMASHFestUK had **increased their knowledge of careers available in STEM subjects**.



A breakdown of the data by venue shows that those attending the events at The Albany were most likely to select ‘strongly agree’ to all of the indicators. The respondents to either venue were not as sure that the festival provided opportunities to explore careers in STEM subjects. Significantly, only slightly over half as many ‘strongly agreed’ that the SMASHFestUK events could provide a forum to talk to their children about science at the Deptford Lounge. This indicates that the activities provided at this venue were either: too few to spark conversation; not designed sufficiently to spark conversations about science; or that information was not communicated by the volunteers as effectively (not as many ‘experts’ on hand); moreover, it could be that the visitors to the Deptford Lounge may be less adept at talking to their children about science (note: these visitors were also shown have a higher percentage of non-users of informal science - demonstrating an unfamiliarity with informal science). These issues can be partially addressed by designing more targeted activities and activities designed to spark conversation between family members and by having a heavier presence of ‘experts’ on hand with targeted learning agendas at the Deptford Lounge.

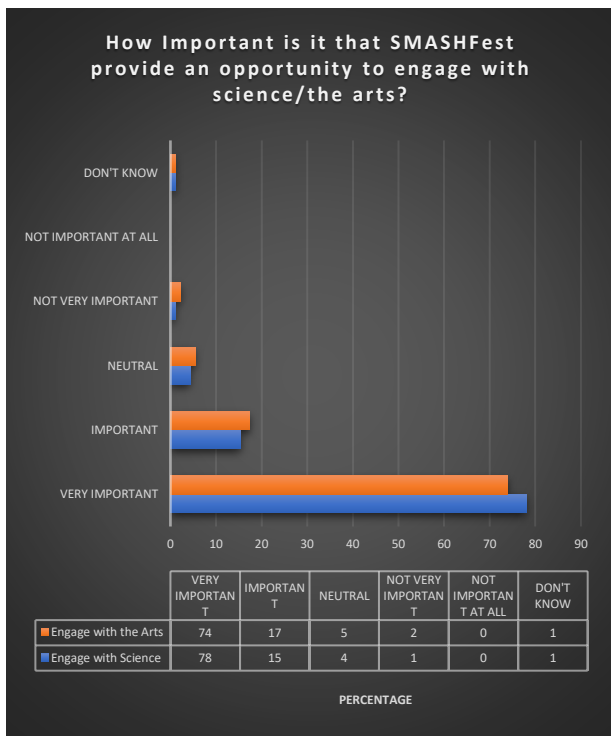
## Bridging the gap between Science - Arts



**90%** of the respondents strongly agreed (55%) or agreed (35%) that SMASHFestUK **helped to bridge the gap between the arts and science.**

Further analysis shows that visitors to The Albany were more likely to strongly agree to this than visitors to the Deptford Lounge. This reflected the broader range of science and arts activities and performances located in The Albany venue.

## Importance of engaging the public in arts and science



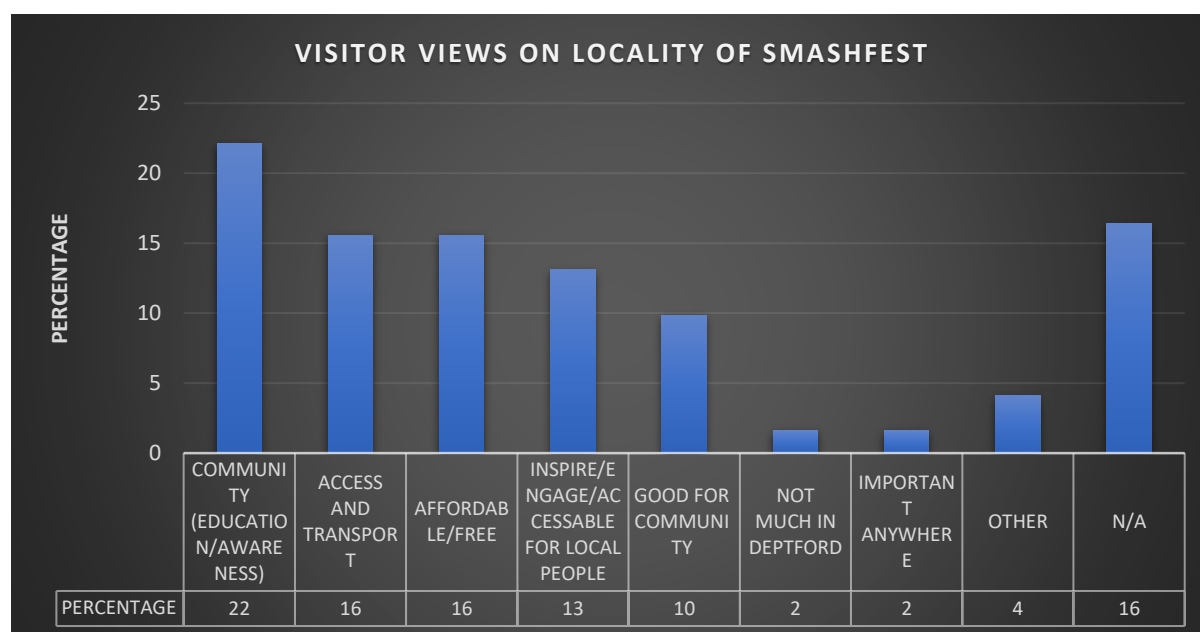
**93%** suggested that it is ‘very important’ or ‘important’ for SMASHFestUK to provide a **forum for the public to engage with science and 91% with the arts.** The above chart shows very little difference between the respondent’s views on the importance of SMASHFestUK providing a forum to engage the public in the sciences or the arts. There was a slight percentage increase in those favouring engagement with the sciences, and this may reflect the interests of some of the families that visited SMASHFestUK seeking science activities specifically (see above). One respondent commented, *“children do not see a distinction between the arts and the sciences - they just look at how the world works”* (Adult Male, The Albany).

The results demonstrate that the local population of Deptford and the surrounding areas are united in their view of the importance of providing opportunities to engage with the arts and the sciences in their local communities.



## Significance of the Locality of SMASHFestUK

Respondents felt that it was important for SMASHFestUK to be held in Deptford because it provides the local population with community-based science education and awareness (22%). Being local and free was felt to also be important to increase access for those that may be restricted by cost or transport (32%). Interestingly, 10% of the respondents commented that the festival was a means to bring the community of Deptford (and surrounding areas) together, signalling that respondents feel that events like SMASHFestUK can extend beyond community education to community wellbeing.



Overall, the respondents signified that it was important for events such as SMASHFestUK to be held within the local community (for the reasons stated). However, some respondents suggested that it would be important to hold it anywhere and another suggested that other deprived areas could also benefit.

Some of the comments are presented below,

*There are not many opportunities in Deptford for kids (that are affordable), we visit the Horniman museum a bit. The kids club struggle to find affordable things to do in the area (we have upwards of 35 kids mainly from low-income families) - £2 is max limit and transport can push costs up*  
(Female, Kids club organiser, Deptford Lounge)

*It will attract families of all races, classes and status' to interact together. The library is a safe environment for my son.*  
(Female, SE6, Deptford Lounge)

*To bring local people out and together! Learning and growing in knowledge and wisdom. It's fun for families*

(Female SE8, Deptford Lounge)

*Great opportunity - kids get excited about STEM and can talk to peers about it. Word of mouth learning*

(Female, SE4, The Albany)

*Because it is right in the middle of the community - often people in deprived areas feel that arts and science is not accessible to them. Free events mean that people can drop-in (from the market, and that is really good.*

(Female, N22, The Albany)

*Parents from Deptford cannot always afford it - ordinary working mums. They need things that they can do in half term - so this is great!*

(Female, SE4, The Albany)

The results demonstrate that SMASHFestUK is perceived as providing vital accessible educational opportunities to the local community. Providing inspiring and engaging activities that are accessible to those on low-incomes or who prefer to stay local.

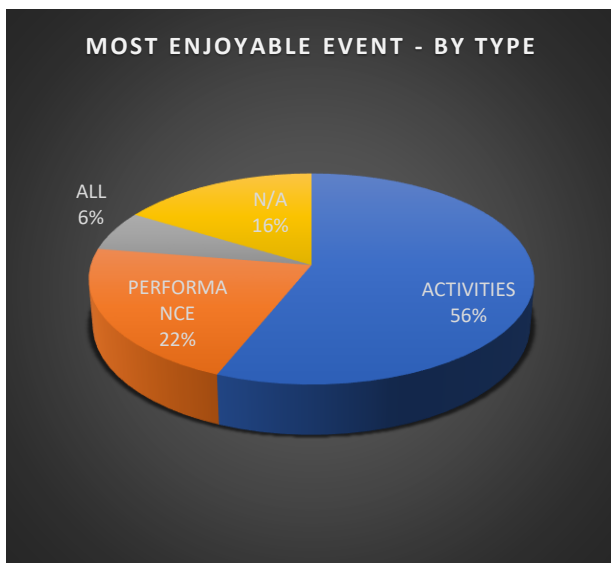


## Ratings

The following section presents the respondents ratings for the events held at SMASHFestUK 2017.

### Most enjoyable event/activity

The respondents were more likely to specify an activity that they enjoyed over a performance (note: there were fewer performances than activities - and no performances at the Deptford Lounge).



The activities or performances that receive the most comments were:

Venue	Activity
The Deptford Lounge	Supermarket sweep Make a volcano (art)
The Albany (activity)	Math and engineering structure zone Survival village (esp. den building)
The Albany (performance)	The Kid's comedy club Fire Mountain

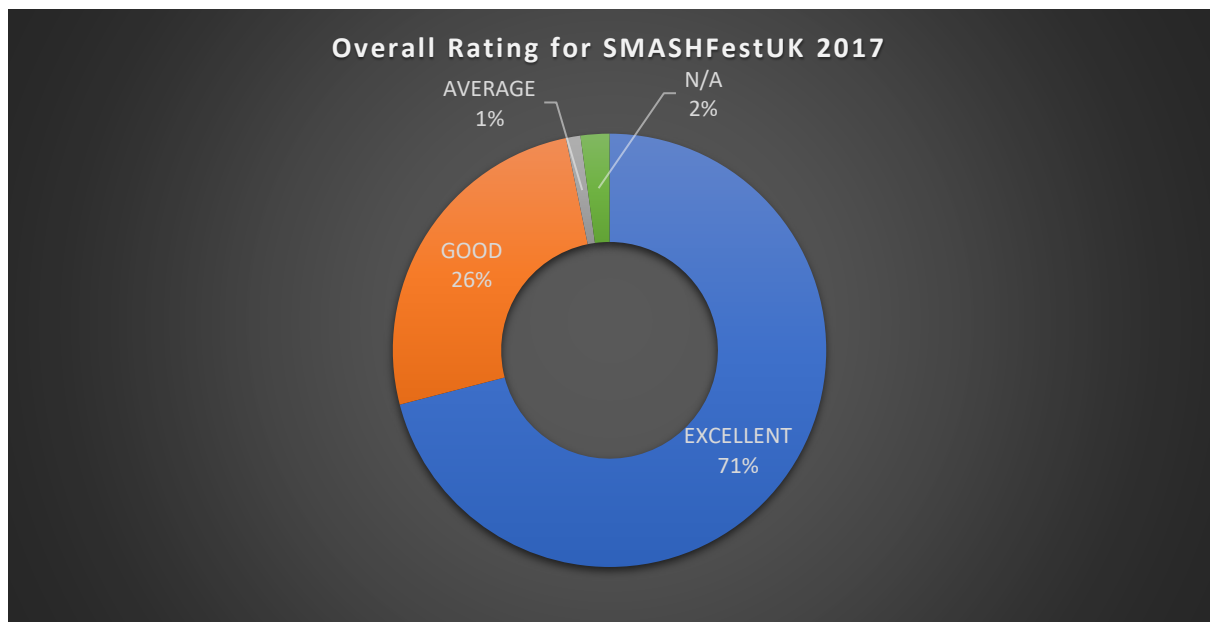
The respondents were impressed that they could see a performance or two and also spend time trying out the activities, many suggested that they had arrived in the morning for the Kid's Comedy and had stayed all day. The wide range of activities and performances on offer means that the spread of 'votes' for each was wide, but particular activities, see table above, were mentioned more than others.

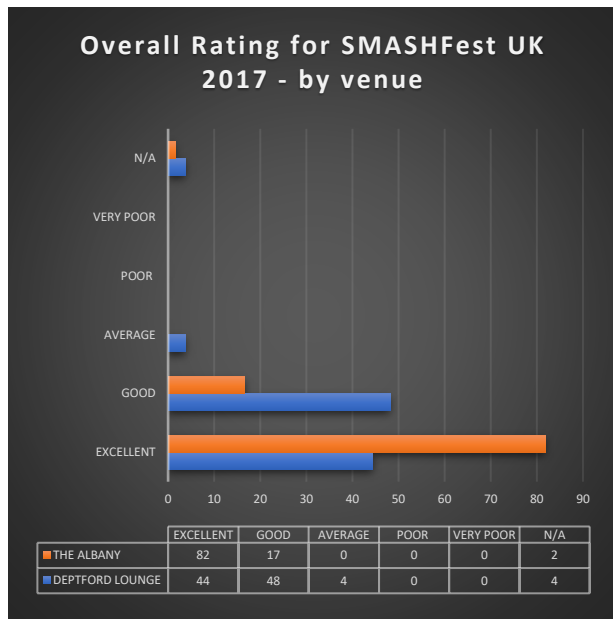


## Overall rating for SMASHFestUK 2017



96% rated SMASHFestUK 2017 Supervolcano! as **Excellent** (71%) or **Good** (26%).





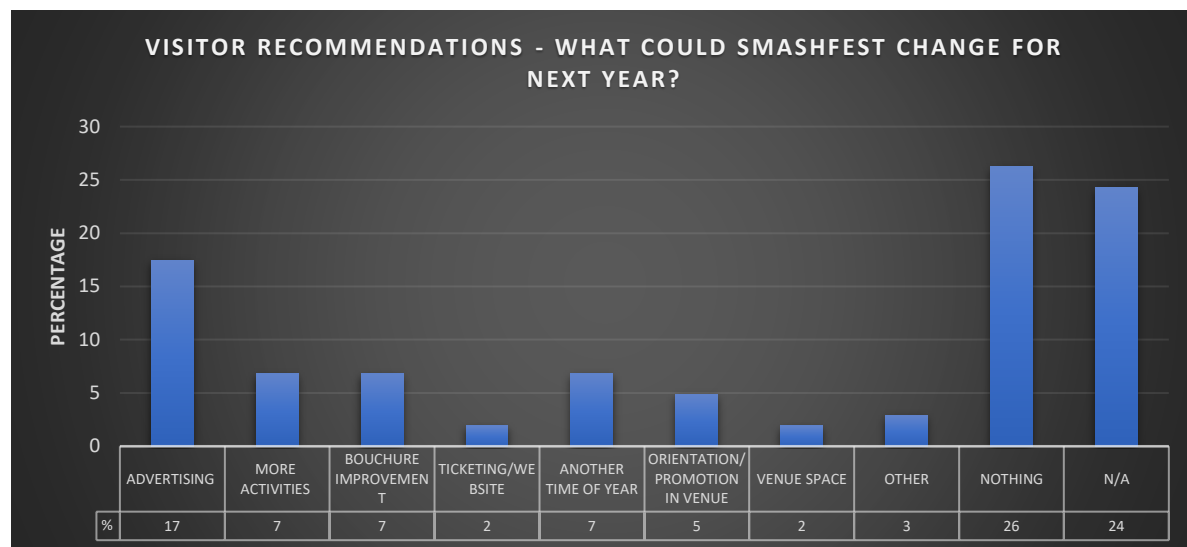
The 'excellent' ratings for the Deptford Lounge are considerably lower than those achieved at The Albany venue (-38% points). The Deptford Lounge had a much smaller range of activities than the larger event at the Albany. These were mainly aimed at KS1 and predominantly kinaesthetic activities. The stay-time at the Deptford Lounge was also considerably less than seen at the Albany. These may account for the lower ratings.



Visitors waiting for the recorded-breaking SuperVolcano!

## Visitor Recommendations

50% of the respondents offered a recommendation to SMASHFestUK. 26% of respondents felt that SMASHFestUK 2017 was 'perfect' and could offer no recommendation and 24% offered no answer. The chart below demonstrates the visitor recommendations made,



The main recommendations referred to SMASHFestUK advertising. This extended from more advertising via local schools, local websites and the local council Facebook or homepage to a local poster campaign (on trees and lampposts). One respondent suggested becoming 'Timeout' magazines recommendation for the day. Many of the respondents had heard about the event via word-of-mouth, suggesting that they themselves had not seen direct advertising (although their relative or friend may have or could have attended an earlier date).

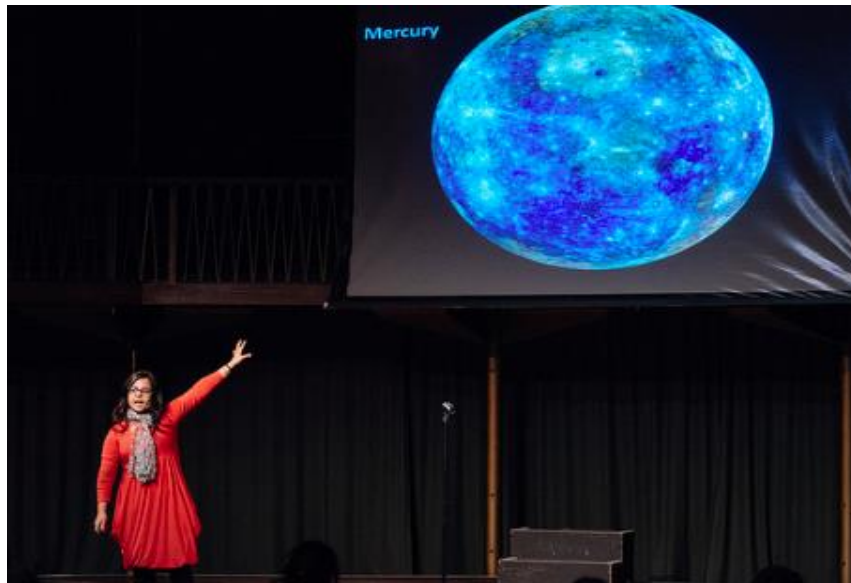
Some suggestions referred to more arts and craft activities that children could take-home or activities specifically for children under 6 (who made up 46% of the total children).

Brochure improvements were also suggested by some, who had found the free brochure difficult to navigate. Two comments made suggestions for age-banding each activity so that parents could easily tell if the activity or performance was suitable for their child. One comment touched on the type-face (too many capital letters) and the amount of white on colour in the brochure (harder to read for dyslexic/visually impaired visitors).

There were a few comments that referred to the booking process and SMASHFestUK website, the latter was said to be unnavigable by mobile devices and the former was said to be arduous and off-putting (this referred to The Albany website booking process).

The orientation around The Albany venue was also mentioned, improvements to orientation signage and promoting the upstairs events were suggested. The lack of space provided for some activities was also mentioned (especially the Escape the Volcano in the Yellow Room).

Other suggestions were to hold the event in the warmer months (summer or spring), or to hold the festival more regularly throughout the year.

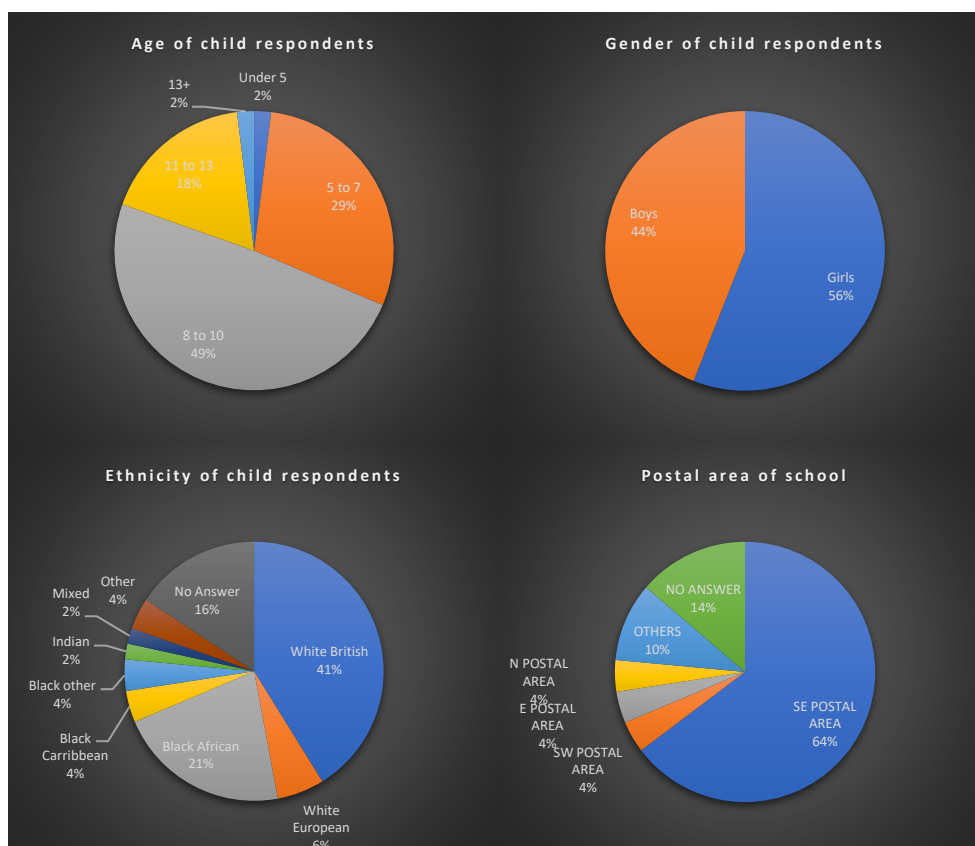


## Children's Evaluation Results - SMASHFestUK 2017





## Demographics of respondents<sup>18</sup>



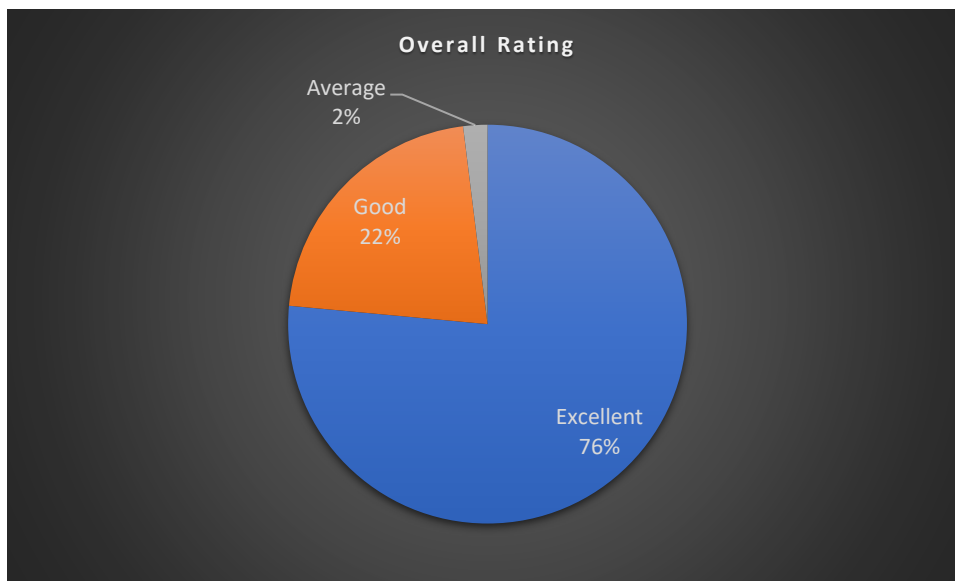
The respondents to the child evaluation were predominantly drawn from the SE postal area schools. The table below provides a breakdown of the individual schools.

Tidesmill Academy	SE8	6
Habberdashers Askey HTG	SE14	12
Habberdashers College	SE14	1
St Josephs	SE8	3
St Judes	SE24	1
William of York	SE23	2
Alexandra park School	N11	2
Kingsdale School	SE21	2
Queensbridge School	E8	1
London Fields Primary	E8	1
St Stevens School	SW8	1
Alfred Slater School	SE16	1
Kender Primary	SE14	1
Myatt Garden School	SE4	1
Childeric School	SE14	1

<sup>18</sup> See page 11 for a full demographic breakdown

Plumcroft Primary	SE18	1
Deansfield Primary	SE9	1
Stanford Primary	SW16	1
Dorothy Stringer	BN1	1
Nursery	SE14	1
Others		3
No answer		7

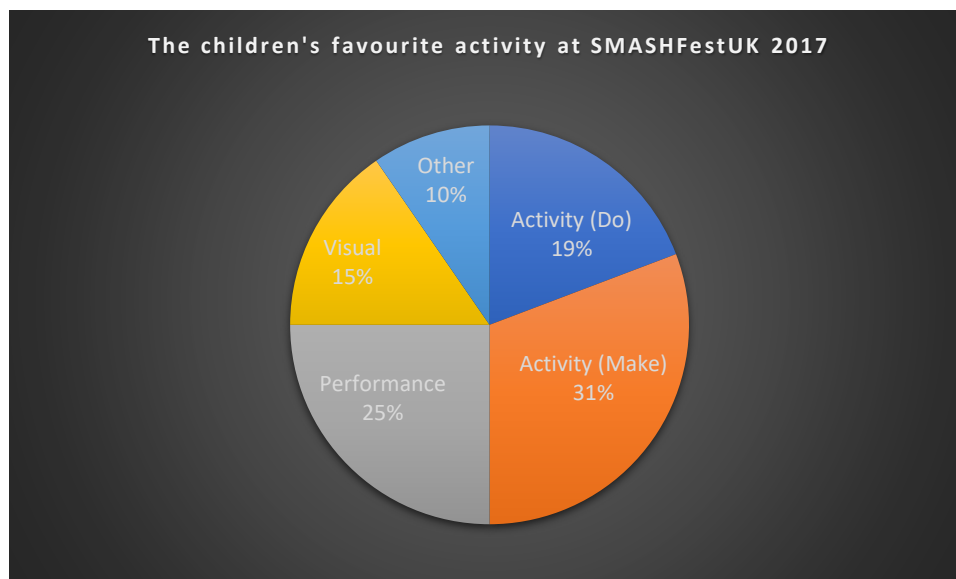
## Overall rating



Overall, 98% of the children rated the SMASHFestuk 2017 experience as either 'excellent' (76%) or 'good' (22%). There was very little difference in the ratings for the Deptford Lounge or the Albany. The overall SMASHFestUK child rating was slightly higher than the adult ratings (71% excellent).



## Favourite part of SMASHFestUK 2017



Key:

Performance	Shows that took place in the main theatre or the red room
Activity (make)	activities involving making something (craft, science experiment, structures etc.)
Activity (Do)	activities involving taking-part in a physical activity (supermarket sweep, escape the maze)
Visual	activities where visitors watch an event (big volcano explosion, science busker etc.)

The children's preferred activities have been divided into the categories of 'active learning' such as an activity to make or an activity to do and 'passive activities' such as performance or other visual items. 50% of the children referred to 'active learning' opportunities - a physical or practical activity where they had to take part. 40% of the children selected 'passive' activities that involved listening and visual skills. This indicates that children are attracted to both passive and active learning opportunities. The table below shows a breakdown of the children's favourite activities,

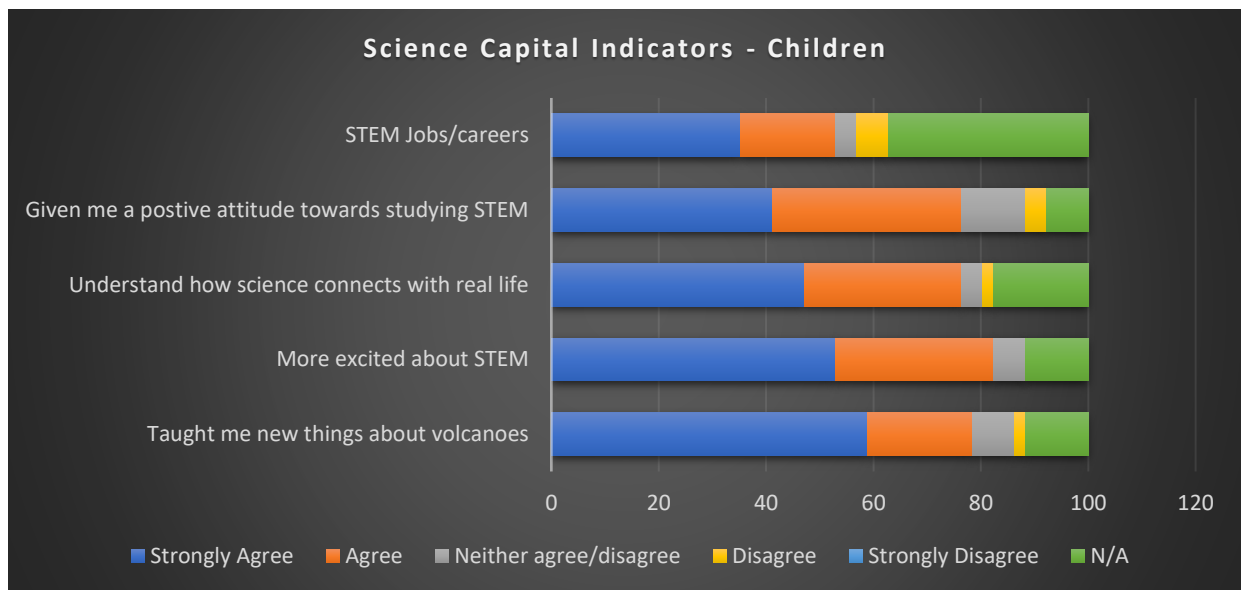
Favorite Activity	Number of votes
Rupture Play	6
Big Volcano explosion	5
Make a Volcano (craft)	5
Supermarket Sweep	5
Engineering structures	4
ID Badge making	3
Escape to volcano (maze)	3
John Wood (science busker)	3
Everything	3
Graffiti tent	2
Space adventures	2
Kids Comedy	2
Maths machine	1
Balloon/Yeast experiment	1

Dr Death	1
VR Volcano	1
Survival Science	1
Stone explorer	1
Biomass Fuel	1
Rapshow	1
Other	1
N/A	1



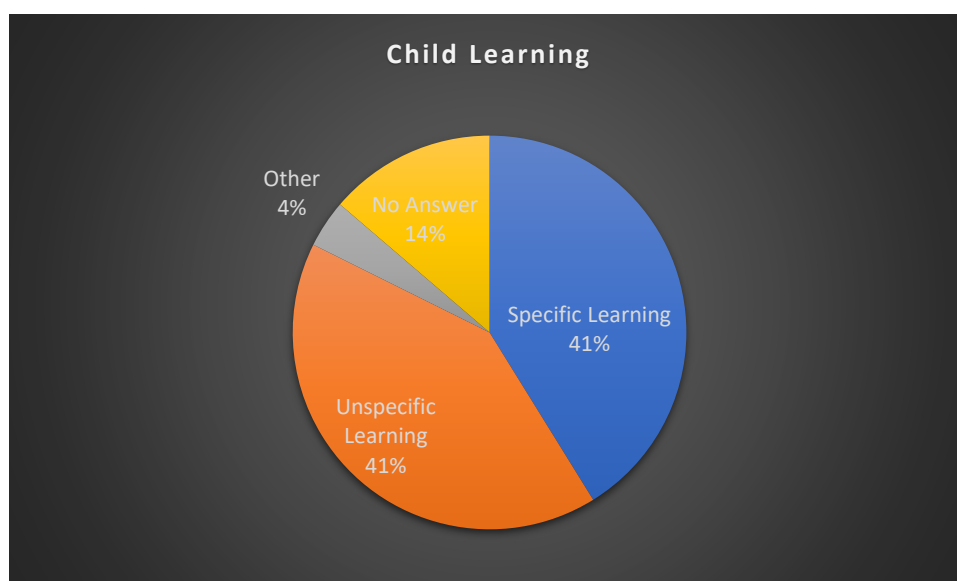
Audience waiting for the Rupture performance.

## Science Capital Indicators



The above chart shows that the children were most confident that the SMASHFestUK 2017 experience had taught them new things about volcanoes (79% agree or strongly agree). They also felt that the event had made them more excited about STEM subjects (82% agree or strongly agree). 76% agreed or strongly agreed that the event helped them to understand how science connects with the real world and the same percentage felt that the event had given them a positive attitude to studying STEM (at school). The children were not as positive that the event encouraged them to pursue a career in STEM (53% agree or strongly agree), similar results were seen in the adult survey.

## Child Learning at SMASHFestUk 2017



41% of the children surveyed were able to specify some new knowledge that they had gained from the SMASHFestUK 2017 festival (such as 'ash clouds contain poisonous gases' and 'Pluto has been downgraded to a dwarf planet' or 'I never knew that there were two types of volcano - a super volcano and a normal one'). 41% of the children could not provide specific information on what they had learnt, but were able to draw or write generic information, such as a picture of a volcano (with no accompanying text) or a picture of their favourite activity (such as the yeast-balloon, structures or supermarket sweep)<sup>19</sup>. The pictures below illustrate some of the children's responses,

Figure 1: drawing of yeast balloon experiment



Fig 2: Drawing of a volcano with information labels

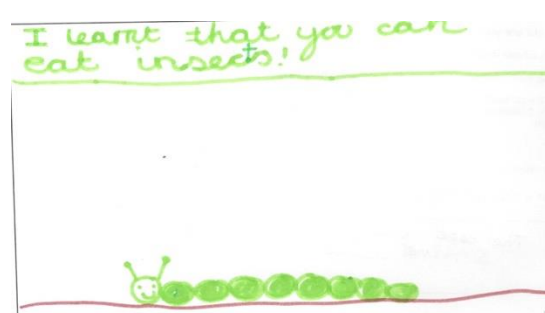
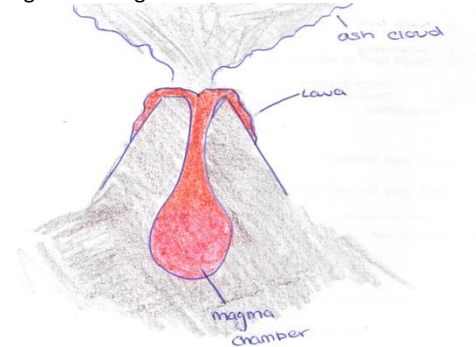


Fig 3: Information gained on edible insects

I never knew that there were two types of volcanos: a super volcano and a normal volcano

Fig 4: Evidence of leaning about volcano types

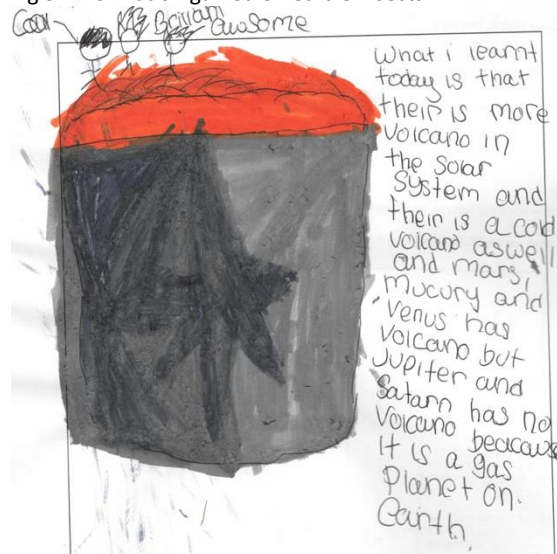


Fig 5: Picture of a volcano with information gained about space volcanos



Fig 6: Ice volcano

<sup>19</sup> This does indicate that no learning had occurred, just that it was not evidenced sufficiently using this method.

## Conclusions to Child evaluation



SMASHFestUK provided the children with a variety of activities, both active and passive throughout the week. The children enjoyed both active and passive activities demonstrating their different learning styles and preferences. 98% of the children rated SMASHFestUK either excellent or good. 79% felt that they had learnt new things about volcanoes and 41% could provide concrete examples of their learning. 82% of the children suggested that the festival had made them more excited about STEM subjects and 76% felt that the event had shown them how STEM connects to the real world and 76% felt that SMASHFestUK had made them more positive about studying STEM subjects at school. 53% felt that SMASHFestUK had enlightened them to careers and further education in STEM areas.

## Group 2: Young Explainers & Volunteers



There were two principle targeted volunteer groups that SMASHFestUK drew upon, young explainers and volunteers. 30 young explainers were recruited from young people aged between 16-25 from local schools, youth groups and colleges and universities. In addition, 32 apprentices from the Royal college of Engineers were recruited as young explainers to support the survival village and other events on the day. The aims for the young explainers was to encourage participation from local youth and to grow confidence in presenting to the public in a range of science/STEM and/or arts communication. In addition, the young explainers could gain valuable experience of team-work, organisation, presenting, communication and public-speaking that are invaluable for professional work and could be added to their CV. Moreover, the experience was hoped to strengthen their confidence in, and future participation in STEM subjects/careers and give access to networking opportunities. The volunteer group were also drawn from the local community (via local community groups) and were there to support the event and gain skills in participation, organisation, team-work and communication.

The evaluation of these groups utilised a pre- and post-evaluation form (for the young explainers and engineer apprentices) and a post-event form for the volunteers<sup>20</sup>. In addition an interview with one young explainers was undertaken.

### Young explainer Results

The young explainers and apprentices had the opportunity to engage with just under 3000 visitors across the week and provide support to academics, STEM professionals, performers, artists, museum professionals, evaluators, volcanologists, geologists and engineers.

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<sup>20</sup> The post forms are in collection and therefore will be added to this report at a later date. Observations have been reported in this section.



One young explainer ran his own stand 'Robot Rescue' following encouragement from SMASHFestUK (see case study below). This engaged the public in 3D printing and robotics technology to aid volcano survivors. He was able to network with other STEM professionals and academics as a result of his participation.

The young explainers gained the following skills as a result of participation - communication skills, organisation skills, STEM communication, networking, STEM knowledge, evaluation experience and teamwork. As well as having opportunities to meet and network with STEM professionals<sup>21</sup>.

The young explainers perceived that the SMASHFestUK experience had increased their confidence in communicating with the general public. The young explainers felt that the experience was useful for their CVs and some of the volunteers were able to network with others in the field and have new/extended experiences because of being a SMASHfest volunteer.



The case study below illustrates one young explainers SMASHFestUK 2017 journey.

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<sup>21</sup> SMASHFest are awaiting the post evaluation forms, these results above were gained from observation undertaken by the evaluator over the course of the festival.

## Case Study 1

**Orlando Miller**  
**19 years old**  
**College student**



Orlando came to SMASHFestUK via the Lewisham youth council young advisors group. He had no prior experience of volunteering at any science festivals. He was interested in volunteering because he had a strong interest in Robotics and felt that SMASHFestUK could provide a forum for him to present to the public. He approached the SMASHFestUK team to propose that he runs his own stall, rather than be a young explainer. SMASHFestUK encouraged Orlando to work his idea around the Supervolcano theme. He developed a concept that combined 3D printing and rescue robots that would encourage visitors to think about the mechanics as well as the ethical issues surrounding using robots in everyday life and rescue situations.

The experience was a great success for Orlando, being part of the event enabled him to network with STEM and robotics professionals and academics. His expectations for the event were exceeded. He comments about his SMASHFestUK experience,

*“from the beginning, I was already interested in networking and trying to create exposure for what I was doing, but what happened was that times ten! Not only did I meet interesting people who were in the same room as me - the guy from the museum asked me to come along and present a workshop over the summer and I was actually asked by some of the parents if I would come and do workshops in their school and they’d pay me as well”*

(telephone interview)

From the connections that he made at the festival Orlando secured some free-lance work in a school delivering Robotics workshops and has been approached to do further work in the summer.

Being part of the event provided Orlando with experience of networking and public engagement that he had not had before, although he is already a social person, the festival experienced helped to develop his skills and confidence in presentation and networking with STEM professionals, he suggested that he has become more confident as a result of his SMASHFestUK experience.

When asked what he feels that SMASHFestUK could do to aid him in future progression Orlando suggested that he’d like to be part of next year’s festival and develop his own work

further through SMASHFestUK. He suggested that additional funding might be useful to develop the stalls and ensure that back-up equipment (such as batteries) were available if needed. He also felt that any additional training that SMASHFestUK could offer would be useful. Above all, the networking opportunities with both the local community and STEM professionals were paramount to his experience and he'd like the opportunity that SMASHFestUK offers to develop these further,

*"I met Alex from the university of Middlesex and that was fantastic, because he does robotics. So, it was great for me to meet him and discuss his course"*

Orlando plans to go to University after college to study Robotics. Although this was always his ambition, meeting Robotics academics at SMASHFestUK has provided him with more information and contacts that he can pursue.

Orlando feels that it is important for young people to be able think of their volunteering as something that they can contribute to in a proactive manner - rather than just turning up to help out.

*"as a young person, we are always hearing stuff like - voluntary work - and that can sometimes be off-putting, especially in the youth meetings that I go to, people are always asking for us to do voluntary work. For me, what pulled me in was when I was able to think outside of the box"*

He felt that young people respond to other young people well, as they can communicate on the same level and have shared interest, but he was keen that young people are able to have some control over their development and gear their participation to their interests.

He felt that although providing experience to put on your CV is useful, he felt that SMASHFestUK could connect with more young people if this was not as heavily billed as an aim to recruit young people. He felt that connecting with young people's interests and aspirations would be more productive in recruiting young people.

Overall, Orlando feels that his SMASHFestUK experience allowed him to have experience of developing and delivering his own workshop/stall with support from SMASHFestUK and exposing him to STEM academics and professionals that he would not have been able to connect with ordinarily. His experience strengthened his passion for his work and added to his confidence in delivering to the public and networking with professionals in the field. He has had follow-up work delivering his workshop as a result of SMASHFestUK and is keen to pursue his career and academic studies in Robotics.

## Group 3: The SMASHFestUk 2017 contributors



There were over 40 contributors to SMASHFestUK 2017. These included, amongst others, comedy and theatre performers, artists, university outreach groups, Eon energy and London transport, musicians, volcanologists, museum representatives and science buskers. The events and activities were designed to impart STEM knowledge and understanding to the public through a predominantly arts-medium in a fun, immersive and engaging way with the overarching narrative of the Supervolcano!. The event aspired to inspire the local population to engage with STEM subjects and promote positive attitudes towards STEM subjects that could, in turn, increase the local young populations overall engagement in STEM subjects post-GCSE.

The evaluation of this group consisted of an online survey administered after the event. In addition, verbal feedback was collected on the day to assess the impressions of the contributors (where possible). The aim of the evaluation of this group was to assess their impressions of the festival and to evaluate their impressions of the impact of their participation to SMASHFestUK.

35 of the participants were sent the online survey. 40% responded to the survey.

### Contributor Outputs

SMASHFestUK collaborated with:

**10 universities** (Middlesex, Greenwich, Goldsmiths, OU, UCL, Sheffield, Birmingham, Imperial, The University of South Wales and Kings College)

**4 museums** (National Maritime, Royal Observatory, Horniman and Science Museum)

**58 researchers** from academic backgrounds and industry participated in planning and delivering events for SMASHFestUK 2017 (15 were trained in public engagement by SMASHFestUK prior to the festival).

### *The Albany Theatre*

**16 theatre space performances** (including kids comedy club, science theatre, rap and folk smashup and a specially commissioned play 'Rupture')

**7 unique science /arts activities located in three activity rooms** (including Escape the Volcano live maze adventure, a virtual reality volcano experience, spectroscopy in a suitcase and map making and robot rescue)

**3 café-space interactive activities** (including Neon mountain animation, volcanologists and microbe spotting)

**9 outdoor-activities making up the survival village** (including Den building, first-aid volcano survival centre, water purification challenge and biomass fuels and rebuilt! Maths and engineering structures).

**1 record-breaking super-volcano!**

**4 roaming entertainers** (including a samba band, science buskers and stone explorer tour)

### *The Deptford Lounge*

**5 arts/science interactive activities** (including Supermarket Sweep, maths structures, make a volcano and volcano stories)

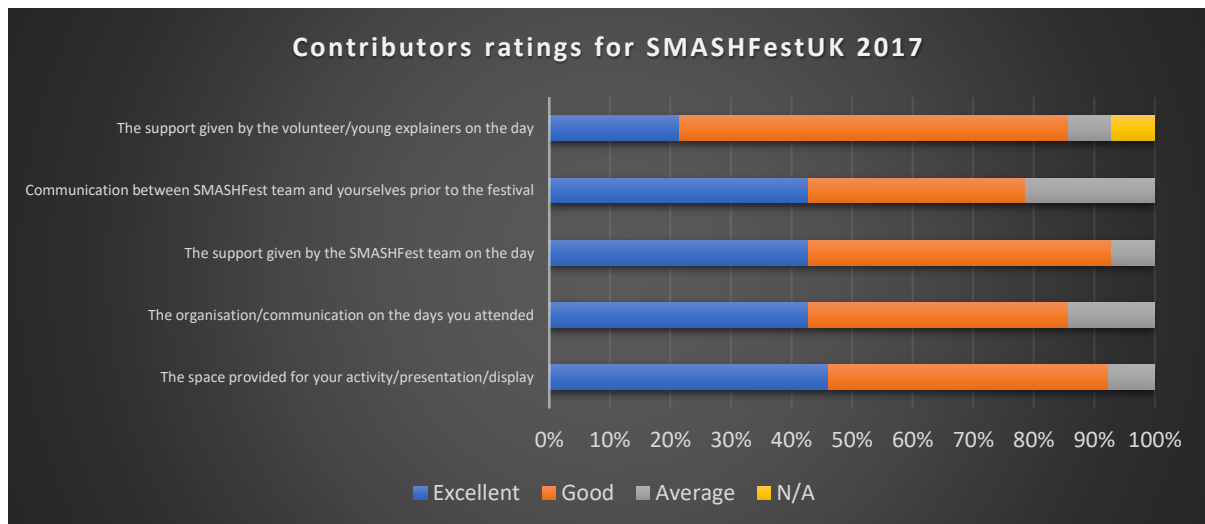
**1 Graffiti tent**



## Contributor Outcomes and Impacts

The respondents to the SMASHFestUK contributors survey were motivated by different reasons, most were motivated by the idea of public engagement and outreach that communicates to hard-to-reach communities (such as Deptford) and spreads awareness and excitement about STEM subjects (there was a strong engineering presence in the survival village). Others had contributed to SMASHFestUK on previous occasions and wanted to take part again. Some contributors were hired to deliver specific activities/performances and others had additional agendas such as recruitment and promotion (i.e. University Greenwich Health and Education). One contributor was attracted by the unique format that SMASHFestUK offered for public engagement and science communication.

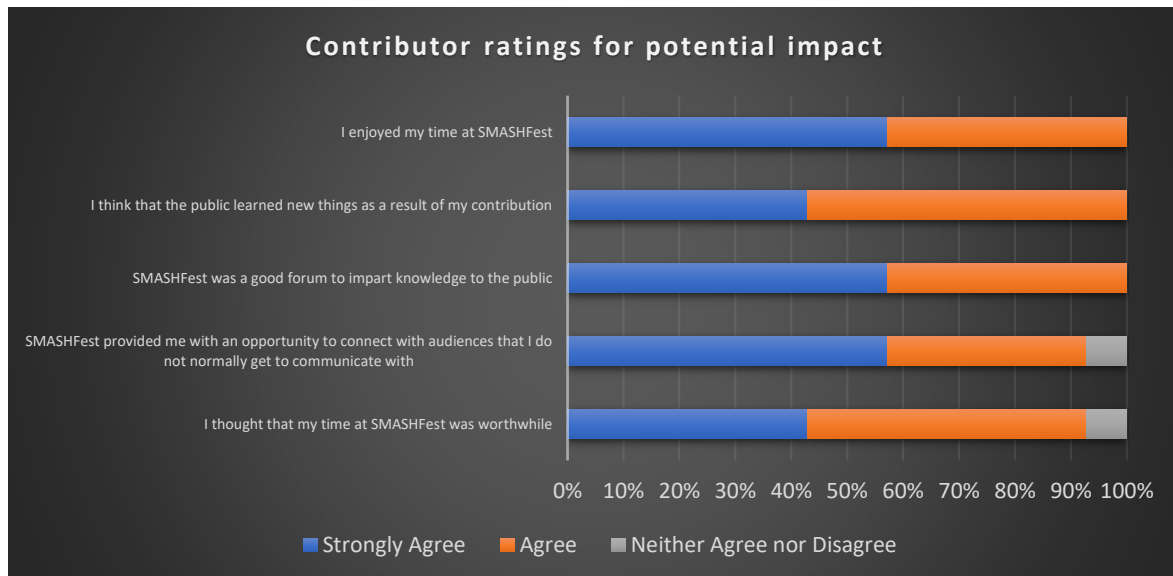
The contributors that presented activities for the public had different numbers of audiences throughout the day, some were busy all day others had busy periods. On average, the respondents felt that they were busy for 64% of the time on the days they attended (with Clockwork watch and Middlesex University 'Heat your Home' being the busiest of those that responded).



The respondents were, in general, satisfied with the level of communication prior to the event and on the days attended. Additional comments gathered from the written and verbal feedback suggest that a clearer timetable of events and plan of the table-space and positioning in advance may have aided some of the contributors in planning what to bring/what to expect and potential number of visitors (Volcanologists table and Marshall Island sea chart). In addition, a clearer instruction on the Passports and stamps would have been appreciated.

The support from the volunteers/young explainers was well received, but was time-consuming for some of the contributors if the volunteers/young explainers were rotated too frequently, as in some cases training was needed (in particular, Escape the Volcano maze and Marshall Island sea chart). However, many of the volunteers were singled out for their professionalism, organisation and communication skills by the contributors.





The respondents were 100% in agreement or strong agreement that SMASHFestUK was a good forum for them to impart knowledge to the public and that the public learned something new as a result of their contribution. This substantiates evidence from the visitors to the same effect. In addition, 100% agreed or strongly agreed that they had enjoyed the event. Most of the respondents also felt that SMASHFestUK provided them with an opportunity to connect with audiences that they do not normally get to communicate with (i.e. diverse communities). There were opportunities for some of the Universities to link their engagement at SMASHFestUK with a wider university impact study, and this was the case for staff from Middlesex University (there could be an opportunity for SMASHFestUK to expand efforts to supporting impact case studies in the future by providing evaluation). In addition, Dr. Ruth Siddall from University College London has since published ‘walking tour in Urban Geology in London’ following her SMASHFestUK urban walking tour<sup>22</sup>

100% of the respondents suggested that they would contribute to SMASHFestUK again if the opportunity arose (and they were available). Verbal feedback collected during the event suggested that both children and adults were engaged in many of the activities, with families evidenced problem-solving together and discussing STEM issues. Intergenerational learning helps to strengthen science capital within families. Contributors commented,

*“It was a great event, the children and parents engaged on various levels, many came back on both days. It was a success”* (Yumi Ayeni, Clockwork Watch)

*“Families were working together to think through how best to protect their egg - some were having discussions about wind resistance and impact”*

(University of Greenwich Parachute egg drop)

<sup>22</sup> For full paper see link <http://www.ucl.ac.uk/~ucfbrxs/Homepage/walks/Deptford.pdf>

Other contributors provided examples of children returning on the second day with artifacts connected to volcanoes to show contributors (Escape the Volcano, Volcanologist). The Den building provided further team-work opportunities that strengthened family relationships and provided opportunities for local families who may lack the space to recreate this activity at home (Chris Harman - Den Builder). The 3D printing robot 'rescue robots' exhibit provoked a lot of interest from parents and children alike,

*"lots of parents were really fascinated and asked me lots of questions about the 3D printing and about coding opportunities for their children. The children were really interested in how robots could help-out in emergency situations and it provoked a lot of conversation"*

(Orlando Millar, Rescue Robots)

In addition, the contributors could use their time at SMASHFestUK to network with other STEM professionals and artists. This was particularly valuable for developing networks between academic staff, professionals and the young apprentices from RAE,

*"I really enjoyed manning the stand with engineers from industry. I had some really interesting conversations with them about their work and it was valuable having them there when talking with the public. In particular, they were able to talk about real industrial applications of the activities we were doing".*

(Aleksandar Zivanovic, Middlesex University)

The contributors played an essential role in providing targeted educational performances or activities to the public, encouraging intergenerational learning and imparting science and STEM knowledge. In return, SMASHFestUK provided the contributors with an opportunity to connect with, and impart knowledge to, audiences that they would not usually have access to and provided opportunities for them to network with young people interested in STEM. Moreover, for academic contributors, it provided an opportunity to fulfill public outreach targets (and potentially REF impact targets), connect with young apprentices/explainers and network across the arts-science discipline.



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## Group 4: School Outreach

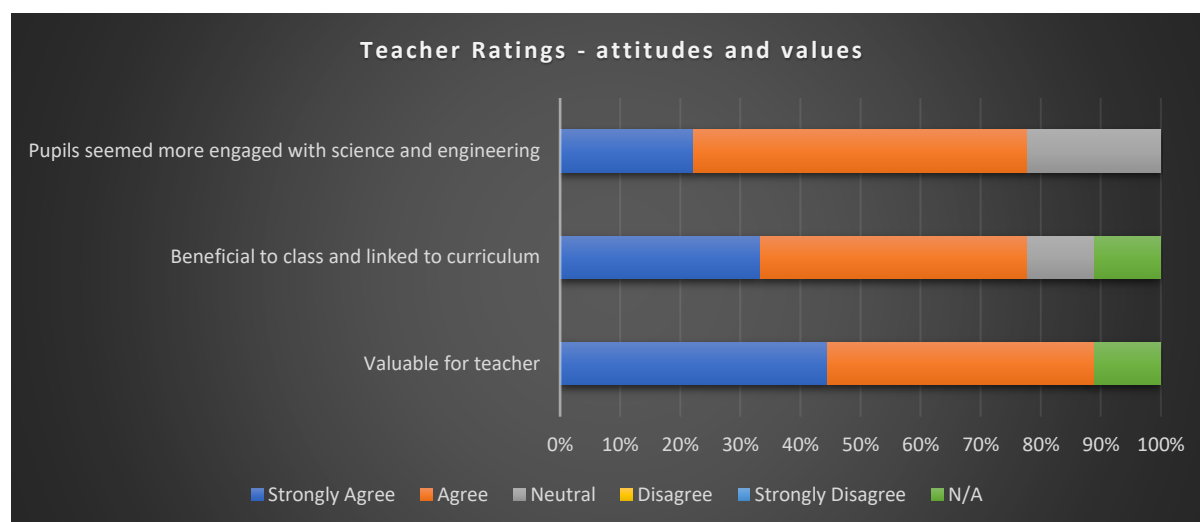
School outreach was undertaken across 9 local primary schools in January 2017, prior to the SMASHFestUK festival. The outreach engaged 3276 children. SMASHFestUK worked with 5 schools that had not had a SMASHFestUK experience before. The aims of the outreach reflected the key aims of STEM practice<sup>23</sup>. SMASHFestUK provided three interdisciplinary STEM immersive workshop that encouraged the children to think and act scientifically in the context of a volcanic eruption. These were:

- Pressure** (Elephant Toothpaste Volcanoes)
- Predicting Volcanoes** (pH testing)
- Lava Slime** (building and engineering in volcanic regions)

The evaluation of group 4 encompassed a concise post-workshop feedback form for the pupils and a longer evaluation form for the teachers. The sample size for the pupils was 249 these were drawn from six primary schools in the Deptford and surrounding areas. Nine teachers from the six schools filled in teacher evaluation forms. The forms have been processed collectively rather than for each workshop for this report.

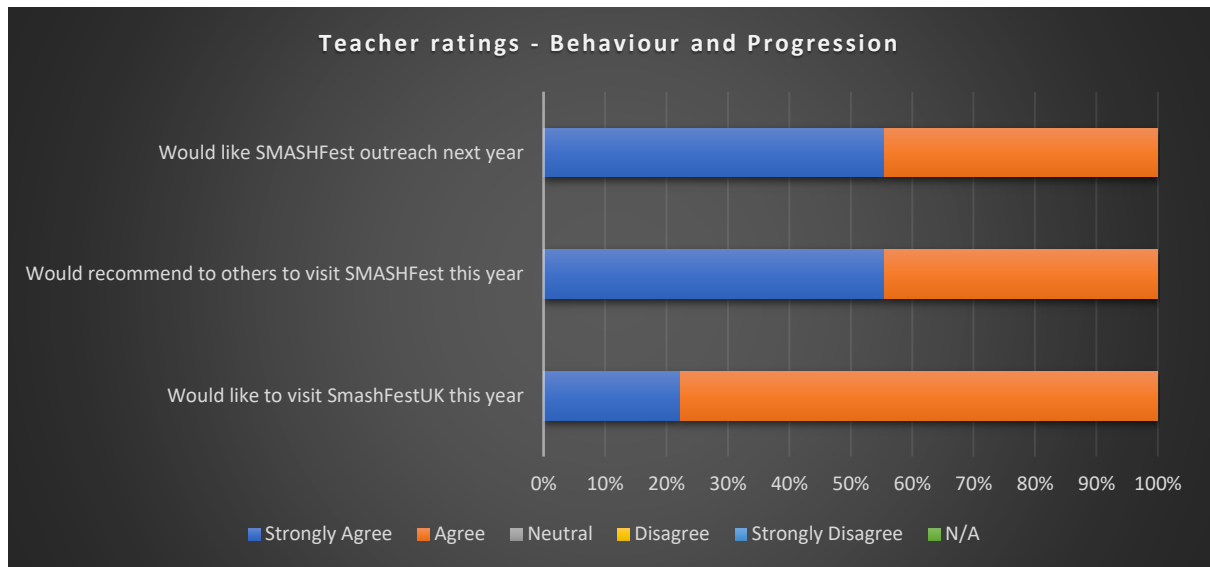
### School outreach - Teacher Results

The teachers were asked to rate six questions on a likert-scale, these related to their attitudes and values and behaviour and progression.



The teachers were confident that the workshops were valuable to them as teachers/educators (90% agree or strongly agree 10% N/A). 78% agreed or strongly agreed that the workshops were more able to engage the pupils with science and engineering than usual (22% felt that they were just as engaged as usual). 78% of the teachers agreed or strongly agreed that the content of the workshops was beneficial to the class and linked to the curriculum. One teacher commented that the class would be starting this topic next year, and therefore the workshop was a taster of what is to come (Teacher, St. Marys).

<sup>23</sup> STEM practice includes: problem solving, critical thinking, creative thinking, collaboration, communication and research.



All of the teachers questioned valued the experience and were confident that they would book SMASHFestUK outreach again and would recommend it to others (100% agree or strongly agreed). The teachers commented about the workshops outcomes,

*“The children learnt to predict what would happen next and write this up”*  
(Teacher, Baring Primary School)

*“The children learnt what a volcano is, where they occur, tectonic plates, safety in experiments and what happens in a volcano - it was very engaging for the children and they are all excited about their learning next year”*  
(Teacher, St Mary’s Primary)

*“They learnt the key features of a volcano, they were able to see volcanologists at their job, to have a go at being a volcanologist - the dressing up was hilarious”*  
(Teacher, Invicta School)

*“I enjoyed watching the excited faces of the children and they watched their bottles erupt”*  
(Teacher, St Mary’s Primary)

*“The hands-on approach was very engaging for pupils. Dressing up as a volcano helped them to learn features of a volcano”*  
(Teacher, Tidemill Academy)

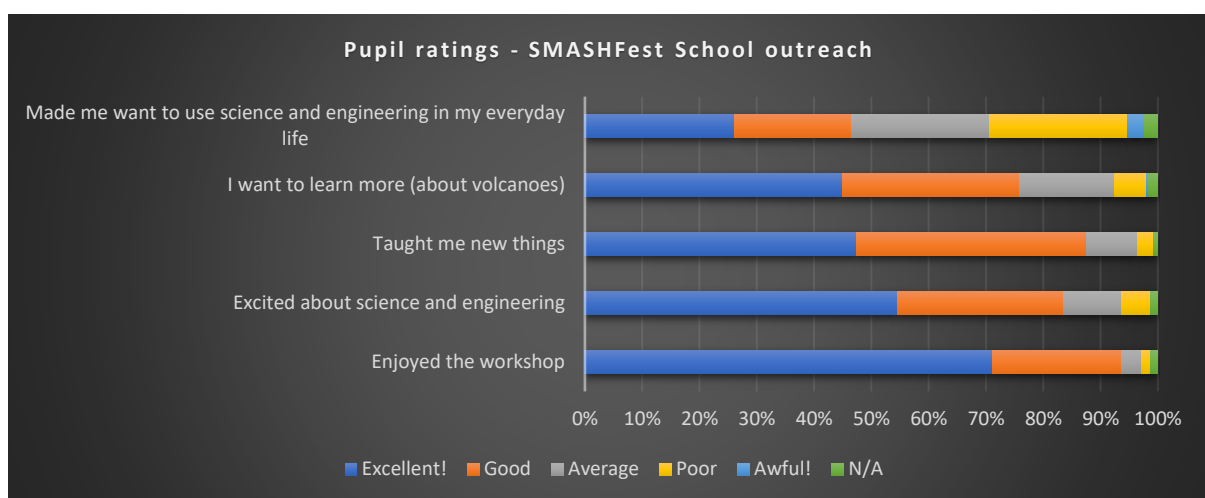
The words that the teachers selected that most reflected the workshops are represented in the word-cloud below (none of the teacher selected any negative words),



Three out of the eight teachers suggested improvements that would benefit the workshops. One teacher suggested that more children could be involved in the hands-on activities (mirroring some of the pupils’ suggestions, below). Two teachers suggested that preparation/information was needed prior to the workshops that could inform them of health and safety/risk assessment or to prepare the children with some of the language and context that was used in the workshop (like ‘gases’ and ‘volcano eruptions’) this would help to prepare the pupils and contextualise their experience.

### School Outreach - Pupil Results

93% of the pupils questioned **enjoyed** the SMASHFestUK workshop.

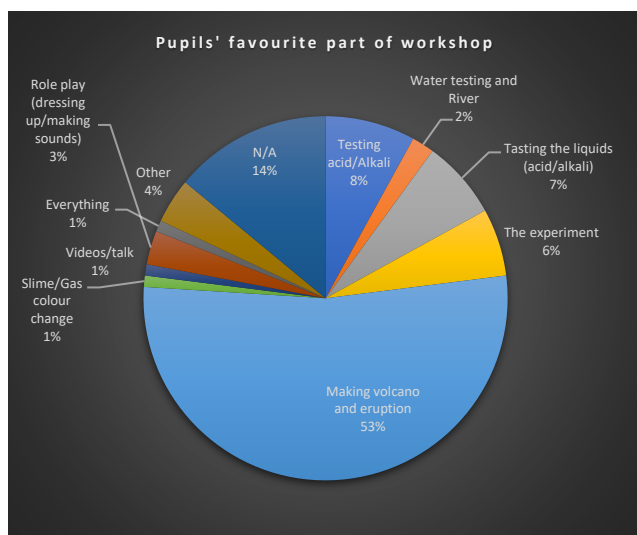


84% of the pupils agreed or strongly agreed that the workshop activities had made them more **excited** about science and engineering. 87% of the pupils agreed or strongly agreed that the workshop activities had **taught them new things** (that they had not known before).

The majority of the pupils wanted to **learn more** about what they could do if a volcano erupted (76% agree/strongly agree).

The pupils were **not as confident** that the workshop had made them **want to use science and engineering in their everyday life** (only 46% agree/strongly agree). The results of this could indicate that the children are not able to link what they did/saw in the workshop with their normal lives. However, it could suggest that the children misunderstood the question and linked the question with whether they would want to experience a volcano in real life.

The pupils were asked to list their favourite part of the workshop. Most of the pupils enjoyed making and erupting the 'volcano' experiment.



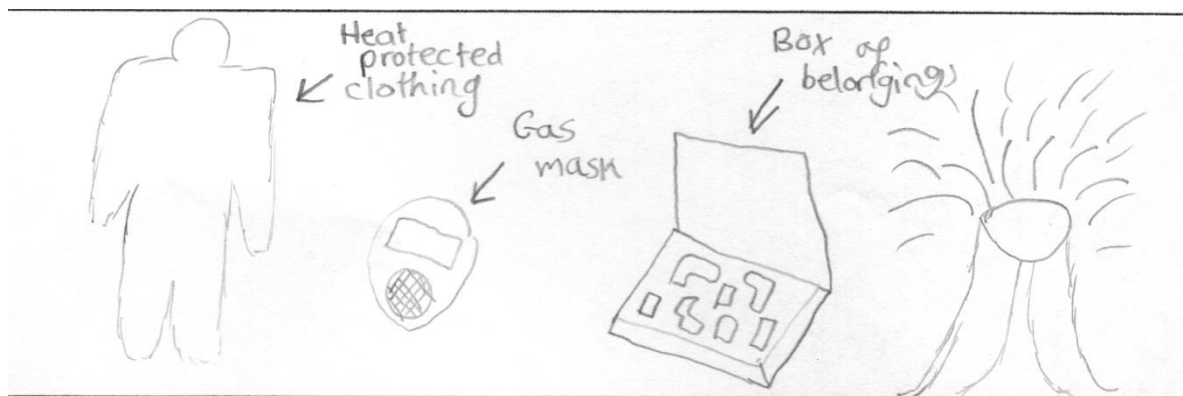
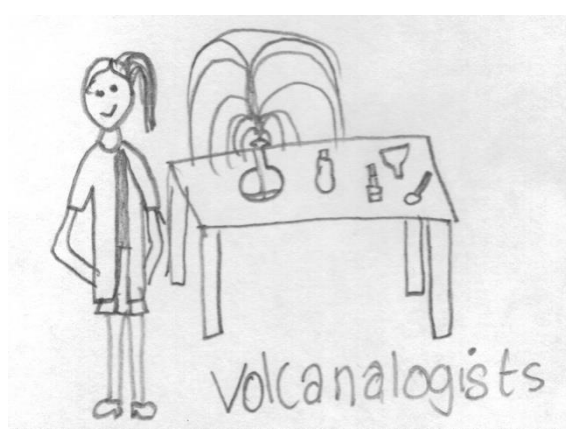
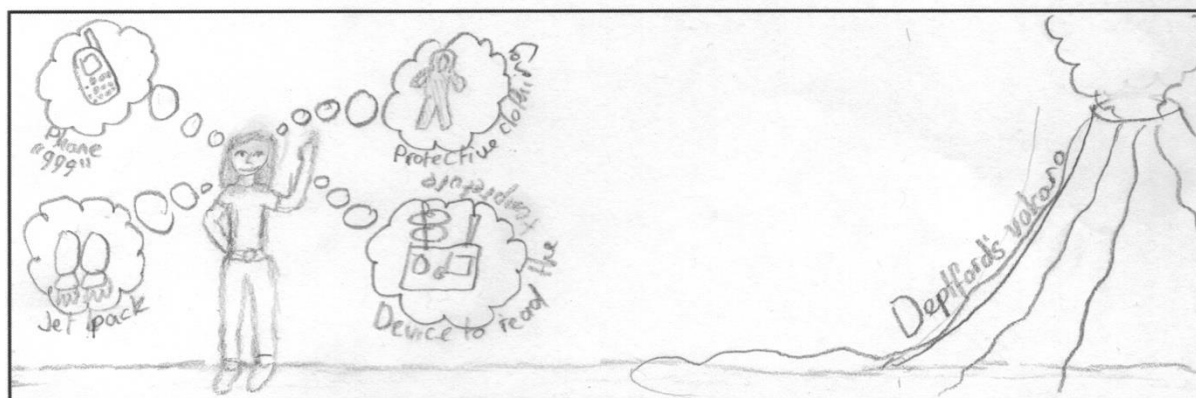
However, many of the pupils suggested improvements on this experiment, such as, making it look more like a volcano, making the colour more like lava and making the experiment bigger (see chart below). Some of the pupils also wanted to take part in **doing** the experiment themselves (rather than watch others).

The children were more likely to list activities that they had directly taken part in (such as dressing-up or role-play)

The pupils also enjoyed the tasting/testing of the acids and alkalis using their taste buds and then Ph. paper to test. The pupils were encouraged to write down their testing to encourage good STEM practice.

The pupils were also asked to draw a picture of themselves as a volcanologist and think about the tools, equipment and protective clothing that they might need if a supervolcano hit Deptford. 238 of the pupils provided drawings/descriptions. Some of the drawings featured a basic drawing of a volcanologist or a tool (107) and others provided detailed drawings that demonstrated deeper-thinking skills (142). Some of the drawings were demonstrative of problem-solving or problem-based reflection that is the for-runner to scientific enquiry, however, without further explanation or investigations could embed naïve notions rather than scientific explanation. For example, one pupil suggested building a wooden wall to protect them from the volcanic flow and another suggested hiding in a concrete box to escape the lava, another suggested using a skate-board to escape the lava flow. Having time during the workshop to discuss these ideas further with the class might be useful to avoid misunderstandings or to test/discuss ideas.

A selection of the deeper-thinking pictures are presented below,



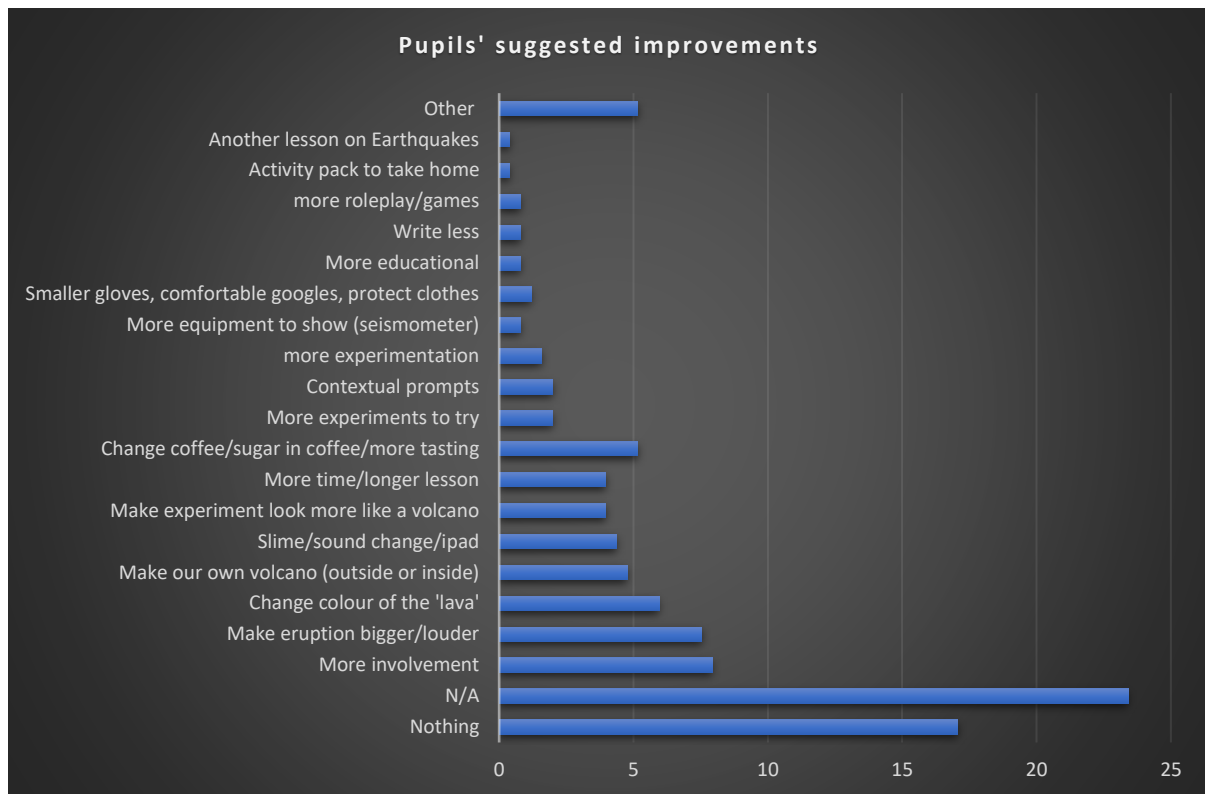
I would go to the river and experiment the water to see where it was going to erupt.



Figures 7-11: Show how the children were able to recall and draw the equipment and protective clothing that they would need if they were a volcanologist.

The above pictures show that many of the pupils were able to express several ideas that show that they have listened to and understood and internalised the workshop content.

The pupils were also asked what they would change about the workshop. Many of the pupils would change 'nothing' (17%) or gave no answer to this question (23%) whereas other pupils gave varied answers - these have been coded below,



Most of the comments referred to making the 'volcano' experiment more visually 'volcano-like', using a model volcano (rather than bottle), red lava and making the whole experiment bigger and louder! Also common was the request for more active (hands-on) involvement for more or all of the pupils (also suggested in the teacher evaluation). Other comments referred to the taste of the coffee without sugar or milk - many of the children suggested putting milk and/or sugar into the coffee (however, it was clear that they enjoyed tasting something that they did not like!). This suggestion by the pupils presents an opportunity to further discuss with the children how adding milk or sugar would alter the Ph. Value and perhaps a test could be added that compares the coffee without milk and sugar to coffee with milk and sugar.

Another suggestion, mirrored by one of the teachers, was to provide more contextual information so that the pupils could link what was being done to real volcanoes and real-life experiences. Some other interesting suggestions were to bring in more equipment to show the class (such as a seismometer) and to provide follow-on activities that pupils could do at home. Some of the pupils suggested ideas that expanded the experimentation and showed scientific enquiry - for example asking to record the volcano erupting, time the eruption and test how high can the temperature can go.

**50%** of the pupils who responded to the survey suggested that **they would like to come to the SMASHFestUK 2017** festival in the half-term. 31% were unsure (perhaps needing to check with parents first). 5% said that they would not like to attend (and 14% gave no answer). Evidence gathered at the festival suggests that 39% of the children hailed from the schools visited as part of SMASHFestUK outreach.

## Overall Conclusions

**Aim 1: To produce an immersive science and arts festival with a strong narrative theme; engaging hard-to-reach audiences with STEM (young people, BAME communities, deprived areas, teenagers, women)**

SMASHFestUK 2017 was able to attract a high proportion of local residents and residents from the surrounding postal areas to its festival. The Deptford lounge venue was more able to attract visitors that represented the demographic of the Deptford's diverse community, however The Albany venue (which traditionally has a bigger reach outside of the local area) was also able to attract a broadly representative audience. 71% of the visitors had never been to a science festival before and it was able to attract 17% of visitors who never normally consume informal science or STEM activities at all, opening-up new opportunities and access to these families. SMASHFest were also able to recruit 30 young people from the local area to work as young explainers at the festival to grow their confidence and aspirations in the STEM arena. In addition, 32 young apprentices from the Royal academy of engineers volunteered to support academics and STEM professionals in engaging and imparting knowledge to the public. Moreover, SMASHFestUK engaged an overrepresentative number of women and girls (62%) in STEM activities.

The Deptford Lounge was able to attract a more diverse audience a higher proportion of whom were not regular consumers of informal science activities. To monopolise on this further multi-age targeted and well supported activities in this venue would be beneficial along with strategies to extend learning and encourage cross-participation across sites.

**Aim 2: Engage more local young people as facilitators/ambassadors (than in 2016)**

In total, SMASHFestUK attracted 82 young volunteers to aid with organisation and delivery on the day. 30 young explainers and 20 volunteers (young and old) from the local community and 32 apprentice engineers from the RAE. This represents an increase of 50% for the young explainers (and a 100% increase of apprentice engineers). The experience presented the young people with opportunities to be enthused about and engaged with STEM and provided networking opportunities and the chance to build confidence in communication and STEM knowledge (as well as in team work, the development of organisational skills and public engagement). For many of the young explainers this was fulfilled. The large number of young explainers resulted in short turn-around times at each exhibit or activity resulting in short bursts of activity and some additional time being spent by the contributors in training volunteers in their specific activity (which was time-

consuming during busy periods). The high numbers of volunteers also resulted in some young explainers having less to do than others. The contributors were, on the whole, impressed with the young explainers and a few were singled out for special commendation. One young explainer was encouraged by SMASHFestUK to run his own stall and his expectations for the experience were exceeded because he was able to network with STEM professionals and academics, engage the public and secure follow-on work and opportunities from the experience.

### **Aim 3: Research and reduce access barriers to STEM with a hyperlocal approach**

Access to STEM was provided to over 6000 individuals (including the festival goers, volunteers, contributors, young explainers and school outreach) an estimated 80% of these are from the local Lewisham or Deptford area. SMASHFestUK were able to attract 17% of locals who would never normally seek out informal science opportunities and were able to provide 71% with their first science festival. By working closely with local community groups and primary schools, SMASHFestUK were successful in encouraging the local population to support and attend the event. Over 40% of the children respondents hailed from the schools that SMASHFestUK had delivered outreach in. The evaluation also found that the visitors thought that SMASHFestUK brought vital educational and engagement opportunities to the area in an affordable and local manner. SMASHFestUK also enabled unexpected outcomes, such as the feeling that the event had contributed to bringing local communities together.

### **Aim 4: Increase the science capital and cultural capital of young people in Deptford.**

The science capital indicators have been discussed below in relation to SMASHFestUK,

#### *Participation in out-of-school science learning contexts*

SMASHFestUK was able to contribute to increasing science capital in the local community by providing free-access to STEM activities in out-of-school contexts (and within schools by providing free workshops). By working with local community groups and schools, they were able to attract a large number of local people to the event (57% from the Deptford or surrounding area, 26% from neighbouring boroughs). In addition, 17% of those who attended were normally non-consumers of informal science (and do not attend museums or science centres). SMASHFest was able to include 2676 visitors and 83 young volunteers in out-of-school science learning. Increasing access to, and participation in, STEM can aid in raising science capital in young people.

#### *Science-related attitudes, values and dispositions and talking about science in everyday life*

The adult visitors were enthusiastic about the event and felt that it presented opportunities to enthuse their families about STEM and provided openings for intergenerational learning, as well as opening-up opportunities to discuss STEM with their children, all of which are key indicators of building science capital within families. 88% of the adults felt that they had learnt something new at the festival (41% of these could provide clear evidence of learning)



and 79% of the children felt that they had learnt new things about volcanos (with 41% being able to provide clear evidence of learning). The children also suggested that the event made them more excited about STEM education and that the activities had helped them link STEM learning to the real world.

Over half of the adults suggested that they were inspired to extend their learning beyond the SMASHFestUK festival and to share what they had learnt with others. Demonstrating that the potential reach of SMASHFestUK is beyond the confines of the festival itself. Adult learning at the Deptford lounge was not as strongly evidenced as it was at The Albany. Although many of the visiting families were frequent consumers of informal science this mainly was via the medium of local museums and the Science museum, 71% had never attended a science festival like SMASHFestUK in the past. Demonstrating that SMASHFestUK is able to deliver new and innovative experiences to frequent, moderate and non-consumers of informal science through the festival experience.

The schools outreach programme had enthused the children and encouraged them to attend the event with their families, thus promoting and encouraging positive STEM family experiences. In addition, 87% of the children felt that they had learnt something new as a result of the school workshops (and 60% could provide visual evidence of their learning).

#### *Knowing people in science-related roles and Family science skills, knowledge and qualification*

The festival had a large representation from the STEM industry and academic arena as well as STEM performers and artists. The festival provided visitors with the opportunity to engage with STEM professional on a one-to-one basis. One visitor was particularly thrilled to meet a real volcanologist, as her and her son had read about them in books, but never had the chance to meet one. In addition, the young explainers and apprentices were able to network and gain knowledge from the experts that they assisted on the day, and there was evidence of networking among both the STEM professionals and the young explainers that was directly a result of the festival.

#### *Knowledge about the transferability of science*

Understanding the utility and broad application of science qualifications, knowledge and skills used in science was explored by SMASHFestUK, but it is unclear whether this has transferred to the visitors although many children and adults felt that the festival helped them connect STEM to the real world. However, the young explainers who had more of an opportunity to liaise with different STEM professionals gained a broader understanding of the different STEM applications available to them from being part of the festival.

#### *Scientific literacy*

Increasing science literacy relates to an individual's knowledge and understanding about science and how science works. This also includes their confidence in feeling that they know about science. SMASHFestUK was able to provide evidence of knowledge transfer between adults and children in both the festival and the schools outreach. In addition, the young

explainers showed evidence in increased confidence in their capacity to talk about science and STEM with others.

### *Summary*

SMASHFestUK was successful in developing areas that can help increase science capital in the local community, evidence was gathered to show knowledge transfer, enthusing and inspiring adults and children, networking with STEM professionals and providing parents with opportunities to discuss STEM with their children, via inspiration and intergenerational learning. Although the variety of STEM careers or application was implicit, it was not clear that this information was successfully transferred to the visitors (although young explainers had more exposure to this). Cultural capital was not measured in this evaluation, although exposure to arts events and theatre, may have played a part in increasing cultural capital. Exposure to science media (another science capital construct) could be developed by promoting and enhancing media options via the SMASHFestUK website (see recommendations).

### **Aim 5: To bridge the gap between arts and science and to bridge gap between science and relevance to life (using real-life situations)**

90% of the adults felt that SMASHFestUK successfully helped to bridge the gap between the arts and sciences and 94% of adults and 76% of children thought that SMASHFestUK successfully linked the STEM learning to real-life experiences. Some of the contributor from industry and academia suggested that the event was a new opportunity for them to engage with STEM performers and artists that they would not normally meet.

### **Aim 6: Deepen relationships with Deptford audiences nurtured in SMASHFest 2017 (repeat visitors)**

22% of SMASHFestUK's visitors in 2017 were repeat visitors (a slight decrease from 2016). Word-of-mouth recommendations were by far the most frequent form of advertising for the event and these grew throughout the week. This suggests that people were supportive and enthusiastic about the event and promoted it within the community. The event was not only seen as providing free and local access to education and entertainment, but also seen by some as an opportunity to bring the local community together in a positive and safe environment.

### **Aim 7: Build a community of science communicators, scientists, performers, audience members initiated in SMASHFest2015 and grow relationships with scientific and cultural institutions already partnered with to bring them to local communities**

SMASHFestUK have built up a strong and loyal community of science communicators, performers, academics and members of STEM industry. They have built relationships with 10 universities, 4 museums and made successful links with industry (Eon and Transport for London). This has grown year on year. They have also grown relationships in the local community including GLYPT, The Lewisham Young Advisors Group, Equality Lewisham,

Lewisham Young Mayors Office, Stephen Lawrence Centre. Lewisham Arts Education Network.

## Recommendations

### SMASHFestUK festival

#### Deptford Lounge

- The provision and space in the Deptford lounge was more limited and many of the activities inside were for key stage 1 children (the graffiti tent attracted older children). Because this venue attracted a broader demographic and a greater number who never access informal science, consideration of how best to develop this area could be undertaken. In addition, the learning outcomes at the individual activities at this venue were not as clear to the visitors and could therefore be more clearly defined to volunteers and visitors. The Organisation at the Deptford Lounge was highly praised by the Library staff.
- There is potential to develop on-going links with the Deptford lounge and the local community by engaging hard-to-reach groups in a monthly after-school or weekend science/STEM-club. This could strengthen relationships in the community, nurture young scientists/STEM enthusiasts and offer new pathways to science capital within the community.

#### The Albany

- Directional signage at the Albany was needed, in particular, to navigate visitors to the upper floor rooms, where there were more activities for older children (a volunteer that could steer visitors upstairs could work equally well). Many of the visitors spent time most of their time at the outside activities.
- Organisational lists and show event information were requested earlier to help The Albany plan the space, anticipate furniture requirements and prepare their staff for the performances. Advanced organisation and planning could also lead to increased participation between the Albany and the volunteer teams in terms of training and induction.
- Organisational lists for the contributors and performers so that all are well informed before the event. Guidance on the space provided for each stand/activity, what they need to bring, the procedure for the SMASHFestUK passports, and SMASHFests aims for the young explainers would have helped the contributors to better plan their activity.
- 16% of the child visitors were under 3 years old and 30% of the child visitors were between the ages of 4 to 6. More targeted STEM activities that cater for this age-group could be beneficial at the Albany.

- Although the weather was fine for the festival, provision and cover for a rainy day (for the outside activities) would need to be well-planned, in advance, to avoid these areas being neglected.

### **Contributors**

- Conduct some front-end evaluation with academic partners to find out how SMASHFestUK can aid in providing robust evidence for REF impact studies.

### **General**

- Directional and informational signage outside both venues was needed to inform the local community of what was going on inside and draw them in.
- Advertising posters at bus stops and the local train station could also attract more visitors.
- The representation from the South Asian community of Deptford and Lewisham was well below Deptford's demographic population, developing connections with local South Asian community groups could mitigate this.
- Age-guidance in the brochure for the different performances or activities could help parents to plan their day.
- To continue increasing the science capital of the young people of Deptford, it is important to establish more methods that impart information about the utility and broad application of science qualifications, knowledge and skills. Although this was implicit in the range of contributors in attendance, this may not have been successfully transferred to the audience. As SMASHFestUK attracts a young audience base is young (under 12 years old) focus on key areas and words that all contributors could talk to families about - such as engineer, architect, mechanic, doctor, research scientist etc.
- Career development: Ask contributors from universities and industry to bring along leaflets to give out to young explainers, volunteers or adult visitors who might be interested in extending their knowledge in further education and apprenticeships.
- Plan the learning objectives for each activity (if relevant) and place on laminated cards or lanyards so young explainers easily access these and impart knowledge to the visitors easily (if on lanyards - young explainers can pass the necklace from one explainer to the other at hand-over times)
- Provide extension activities on the SMASHFestUK Website - so that adult and child visitors can extend their knowledge and follow their interests (over 40% of adults said that they would Google more information about something they had learnt). Promote this at the event "if you want to find out more..."

## Volunteers and young explainers

- Target some of the young explainers' interests (can be established in the front-end evaluation) to place them with a corresponding activity (if available - i.e. interest in renewable energy, interest in art, interest in evaluation).
- Encourage more young explainers to develop their own area of engagement, take ownership and develop this with support and/or additional training from SMASHFestUK (as in case study).
- Provide post-festival training/information opportunities to young explainers who have been enthused by their SMASHFestUK experience (to retain their interest and support for the following year).
- Limit the change-over times of the young explainers so that they get a longer, more in-depth experience at different activities (no more than 4 change-overs). This can help build confidence in individuals and enable them to hone their skills. This also aids the contributors, as they don't have to retrain the advisors as regularly.
- Plan activities in advance (where possible), so that each young explainer can prepare what they are doing and carry out additional research if necessary to help them impart their knowledge to the public. Prepare timetables in advance if possible.

## School outreach

- Provide pre-information for the teachers that covers some contextual information that they can impart to the children before the visit and information on risk assessment/health and safety.
- Place school outreach information on the website as a reference for teachers. Provide pre-information and post-visit extension exercises and print-outs, that can be accessed by teachers or pupils.
- Try to include an activity that all the children can take part in - group activity (role-play or a game).
- Make the bottle-volcano experiment look more like a volcano!
- Ensure that there is time to discuss the ideas that children might have about volcano survival - what would work and what would not work. This can ensure that naïve notions are not embedded.

- School workshops are most effective when linked to the curriculum and presented just before, during or after the topic is covered. If possible, try to plan presentations to coordinate with topics.

## Evaluation

- An evaluator is needed at each site to ensure capture of data
- Some young explainers did a better job than others at collecting data. A dedicated team might have worked better to ensure smooth running at the event, as confidence in approaching visitors grows as time goes on.
- See separate 2018 evaluation strategy for further details.



## Appendix A

### Research methods

#### *Adult and Child Evaluation*

Data was collected using face-to-face interviews with adult visitors exiting (or after having an extended stay) at SMASHFestUK at both venues. The questionnaire was designed to cover a broad range of information that mirrored SMASHFestUK's aims and objectives. Questions were structured around visitor profile (demographics), visit profile (about the visit/experience), science capital and informal science access, perceived and actual examples of learning, information on locality as well as recommendations and progression. Each interview lasted between 7-12 minutes and was conducted by the evaluator or a young volunteer from the SMASHFest volunteer pool. Visitors were approached at random using a 'third past the post' method (where possible). An evaluation table was set up at both venues so that visitors could complete the questionnaire themselves if desirous. A tally count was also attempted at each site to record the total number of children and adults that attended the events. The child evaluation forms were self-administered and help offered when needed.

#### *Young Explainers*

A self-administered pre- and post- comparative evaluation form was administered to the young explainers to gauge their expectations, prior experience and confidence in public engagement. Volunteers were sent an online post-festival survey to gather their thoughts and reflections on the experience.

#### *Contributors*

30 contributors were sent an online post-festival survey to complete. Questions were structured around their observations of the SMASHFest experience (including support and communication before and on the day), the outcomes of their experience and their thoughts and suggestions for 2018. In addition, university contributors were asked whether the outreach was part of a REF impact statement.

#### *School Outreach*

A self-administered pupil and teacher feedback form was provided to each class that experienced the SMASHFestUK school workshops. These were filled in and returned on after each workshop.

All data was collated and analysed using excel.