# UK Space Agency Principia Education Programme Report: The reach and spread of its projects


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# Headline summary

- Up to March 2017 it is estimated that over 1.6 million children and young people have participated in the educational outreach programme linked to the Principia Mission since it started in 2014. This represents 15% of the total UK school population in any year.

1.6 million young people have participated in the Principia Mission educational outreach programme (2014 to March 2017)


9,894 schools were involved, representing 31% of all schools in the UK

- Participants came from 9,894 schools. This is equivalent to 31% of all schools in UK. In addition, some projects within the programme sent out resources or set up websites whose use is not easily and accurately measured in terms of participants. As a result of this, the overall total is likely to be well over 1.6 million. Many of the projects are still going on so the number will have increased since.
- The programme has successfully reached schools and pupils of all ages in different phases of education (primary, secondary and post-secondary) and in different types of establishment (e.g. academies, community, voluntary and independent schools) in close proportion to the UK's overall school population.
- Schools and participants in different parts of the UK (England, Scotland, Wales and Northern Ireland) were well-represented.
- Schools from large urban centres, towns and cities, rural villages and small hamlets were also well-represented. These were broadly representative of the national distribution of schools.

# Introduction

Increasing the number of pupils and young people studying STEM subjects (science, technology, engineering and maths) has been a concern for successive UK governments in the last two decades. In

2014 the Prime Minister claimed that maths, science and technology should be a top priority if the UK is to compete in the global economy. He announced a scheme estimated to cost £67 million to train 17,500 maths and physics teachers to a higher level than current training, and attract more postgraduates with offers of university bursaries (DBIS 2014). The 'science problem' of too few STEM graduates has also emerged in the EU, US and other developed countries (Lamb et al. 2017, DfE 2015, Smith and Gorard 2011, Brophy et al. 2008, Brett 2007). In response, many bodies including governmental, non-governmental and charitable organisations, as well as representatives of industry, have been actively involved in attempting to increase interest, attainment and participation in STEM subjects at school and beyond. Previous studies have suggested many reasons why certain sub-groups in the population may be underrepresented in STEM subjects at school, and identified factors influencing STEM participation beyond secondary school (Gorard and See 2008, 2009, Tripney et al. 2010, Chowdry et al. 2013).

Considerable public funding has been allocated to programmes intended to improve attainment in STEM subjects at school, and encourage participation in STEM-relevant education and training beyond and outside school. The STEM Mapping Review revealed over 470 STEM initiatives run by government departments and external agencies as early as 2004 (DfES 2006). All were designed to engage young people, and in particular under-represented groups, in STEM subjects. The number and range of such interventions has increased considerably since. However, the actual impact of these efforts in reaching young people across the UK and in different SES groups has not been fully investigated. For example, the Science and Innovation Observatory by Sheffield Hallam noted that most studies were evaluations of a single event, and in one supposedly longitudinal study, evaluation was merely an on-the-day survey (Coldwell and Mannion 2011).

This report looks at the reach of a programme of 34 projects based on the interest and educational opportunities arising from the astronaut Tim Peake's Principia Mission to the International Space Station (ISS). The long-term impact of the programme is being investigated independently by the University of York. Our concern is to estimate how many young people took part in these 34 projects, and to consider their age, socio-economic status and geographical spread.

## The Principia mission

The 'Principia Mission' was the name given to astronaut UK Tim Peake's expedition to the International Space Station (ISS). The name 'Principia' was chosen by Peake to celebrate Isaac Newton's seminal text *Philosophiæ Naturalis Principia Mathematica* (Latin for "Mathematical Principles of Natural Philosophy"), which described the principal laws of motion and gravity on which all space travel depends. The ISS provides a unique and important scientific research facility, meaning that Peake and his colleagues were able to undertake a range of experiments that could not have been done on Earth, including in physiology, biology, materials science, solar physics, radiation physics and technology.

The UK Space Agency and the European Space Agency were keen that the mission would inspire others, particularly children, to develop an interest in space, STEM subjects at school and beyond, and the career opportunities available in this field. They developed a programme of 34 distinct educational and outreach projects for children and young people of all age groups involving schools, other organisations, and the wider public across the country. The UK Space Agency estimated that by the end of 2017 these projects would have cost over £3m and reached over a million young people. It is important to establish independently how many people have participated, and so provide information for planning future activities as well as to publicise current and future initiatives.

The programme of projects was devised by the UK Space Agency in partnership with outside organisations, and designed for schools, other educational groups, home educators and individuals. These projects are listed in Table 1 in order of popularity in terms of the estimated number of participants involved (we explain how we estimated the number of participants later).

**Table 1: The Principia education projects**

| No. | Project Name | Number of participants |
|---|---|---|
| 1 | Destination Space: Association of Science and Discovery Centres<br>Destination Space is a series of family shows, workshops and other events linked to the Principia mission | 727,917 |
| 2 | Rocket Science: Royal Horticultural Society<br>This was an experiment where participants compared the growth of rocket seeds that have been to space with seeds that have not been to space to investigate the effects of space on plant growth | 589,654 |
| 3 | Amateur Radio on the ISS (ARISS) calls with Tim Peake<br>ARISS conducted a competition to enable schools to speak to Tim Peake directly during his stay in space using amateur radio equipment | 44,145 |
| 4 | Cosmic Classroom In flight call: with Times Education Supplement<br>This was a one-hour live lesson from space, which was live streamed and supported by teaching resources. | ≅ 400,000 |

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| 5 | Tim Peake Primary Project (TPPP): ESERO-UK (ESA education office in the UK)<br>This project aims to increase enjoyment and engagement in science using space themes, with a network of space ambassadors. A range of space activities were organised, which included professional development for teachers and information on career opportunities in maths and science | 118,471 |
| 6 | Space diaries: The Curved House<br>This is an online project where schools can access the entire Space Diary for free, plus lesson plans, teaching materials, games and extension activities | 105,603 |
| 7 | Mission X<br>Mission X is a programme developed by NASA and the European Space Agency scientists and fitness professionals to inspire students to learn about the science of nutrition and exercise as well as to increase their activity levels. The programme is open to schools around the world. | 102, 945 |
| 8 | Team Tim shows: Space Fund<br>These are interactive science shows delivered by trained presenters, and feature 'live' satellite interviews with Tim Peake | 31,014 |
| 9 | Space to Earth: Venture Thinking and Triathlon Trust<br>This initiative challenges students to use Tim Peake's training regime to run, swim, cycle, climb, dance or exercise the 400 km distance from the Earth to the International Space Station orbit. | 22,695 |
| 10 | Aberdeen Science Centre<br>This project involves an interactive lab module, modelled on the Columbus research module of the International Space Station, where visitors can participate in a range of hands-on STEM practical activities and challenges | 14,507 |

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| 11 | Royal Institution lectures<br>This is a series of lessons for primary and secondary schools with teaching resources produced by The Royal Institution (RI) based on their popular 2015 Christmas Lecture, *How to Survive in Space.* | 14,400 |
| 12 | Principia Schools Conferences: UK Space Agency<br>This was a pair of conferences held in Portsmouth and York to showcase the work done by students across the UK who had participated in a Principia project. | 13,743 |
| 13 | Astro Academy Principia: National Space Academy<br>These online resources and CPD sessions used demonstrations filmed on board the ISS to teach fundamental physics and chemistry. | 7,680 |
| 14 | Mission starlight: Royal Society of Chemistry<br>This project is a global experiment to investigate materials that block or reduce UV light | 6,680 |
| 15 | Astro Science Challenge: Unlimited Theatre<br>The Astro Science Challenge is an interactive space adventure using online films, stories and activities to get children to take on missions where they learnt about space, weather, astronomy, computer coding and nutrition. | 5,626 |
| 16 | Into Film talks and workshops<br>These were mainly career talks delivered by STEM ambassadors, held in public places, for example, Big Bang @ Wales and the UKSA Outreach Day in Portsmouth and York Universities, but most were hosted in schools across the country. | 5,464 |

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| 17 | Into Film Screenings<br>These were part of the Into Film Festival with hundreds of screenings across the country, accompanied by a talk from someone in the space industry. Two of these screenings were specific to the space mission. They were the Imax films, *A Beautiful Planet* and *Space Station 3D*, which were shot on-board the ISS. | 5,205 |
| 18 | STARS project: Astrobiology Society of Britain<br>Under this project, scientists from 13 different institutions went to schools to give talks and workshops on Tim Peake's Principia mission, life aboard the International Space Station, astrobiology and the prospect of becoming an astronaut. | 4,000 |
| 19 | Three Minute Learning (3ML): University of Glasgow<br>Three Minute Learning (3ML) is an online resource for schools with short stories on space, science, engineering, arts and society, most of which were based on interviews with Principia personnel, including Tim Peake. | 3,493 |
| 20 | Great British Space Dinners: with Heston Blumenthal<br>This is a project where children design a healthy balanced menu for Tim Peake to eat in space. | ≅2,000 |
| 21 | I'm an astronaut, get me out of here: Gallomanor<br>This is a programme where children were able to chat online with engineers, scientists, technicians, astronaut instructors, medics, flight controllers and other individuals who were involved in the Principia mission. | 1,745 |
| 22 | British Association of Planetaria<br>The British Association of Planetaria brought to life stunning, high resolution, photo-realistic images of the ISS in large, static and small, mobile planetarium domes screened across the UK. | 1,235 |

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| 23 | TimPix: Research in Schools<br>This project offered schools the opportunity to carry out their own research using radiation data from Timepix detectors (based on technology from CERN) on board the International Space Station. | 1,233 |
| 24 | Into Film competition<br>This is a competition where young people were invited to create short films, clips, animations or moving images of up to three minutes, inspired by the Principia mission. | 1,052 |
| 25 | Earth Observation Detective: National Centre for Earth Observation<br>This was a competition where participants had to pick a place on Earth that they thought Tim Peake should photograph from space, and give their reasons why. Top trump cards were also created to profile Earth Observation experts, as well as an app as an interactive resource to learn more | 909 |
| 26 | Novium Museum<br>This programme was hosted by the Novium Museum in Chichester. It included an exhibition of Tim Peake including his training and life aboard the ISS, a series of workshops, loan boxes and sleepovers for children in the museum. | 630 |
| 27 | Astro Pi competition: Raspberry Pi Foundation<br>This was a competition where school children were asked to suggest ways that they could use the two augmented Raspberry Pi computers (called Astro Pis) which were equipped with a Sense HAT and an infra red and visible spectrum camera.. The winners of the competition got to run their code onboard the ISS | 549 |
| 28 | MP3 and Sonic Pi competitions: Raspberry Pi Foundation<br>These were two competitions. One required young people to write code in order to turn the two Astro Pi computers into an MP3 player so that Tim Peake could listen to the music on the ISS. The second required children to code Sonic Pi music for Peake to listen to via the MP3 player. | 67 |

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| 29 | Marvin and Milo: Institute of Physics<br>These are comics developed by the Institute of Physics to encourage young people to engage in Physics in exciting ways. | No data but 2,000 copies of the comics were made |
| 30 | One Giant Read: Literature Works<br>This is a project with a space and STEM theme where participants share their reading experience online to explore how science fiction inspired science fact. In addition, there were book reviews and interviews with scientists. | No data available - but we know that there were 58,715 page views for the website and 6,465 of Principia specific content |
| 31 | Astronaut handbooks: Usborne<br>A free, downloadable guide to becoming an astronaut, full of funny and fascinating insights, plus a personal message from Tim Peake. | 13,000 copies sent out |
| 32 | Speak to Peake: BBC Wiltshire<br>Before Tim's flight, BBC Wiltshire ration ran a competition for local schools. Children were asked to suggest questions to ask Tim, and the best answers were selected to come to the UK Space Agency and ask Tim their question via Skype, who was training in Houston. BBC Wiltshire supported the competition in schools with further lessons and coverage on the radio. | No data available |
| 33 | Zero Robotics<br>The Zero Robotics tournament turns the ISS into a gaming arena for football-sized satellites in a virtual field filled with obstacles. Students compete against each other, writing code to control the satellites on the space station. | No data available |
| 34 | "Adventures in Space and Tim" podcast: Helen Keen<br>This is a series of podcasts hosted by comedian and space enthusiast Helen Keen (creator of BBC Radio 4's multi-award-winning *It Is Rocket Science*). This podcast was inspired by Tim Peake's mission. | As of 30 March 2017, 13,000 listeners had already tuned in to the podcasts. This figure is likely to rise over the series as more people tune in. In fact steady increases had already been reported since the launch of the new round of Facebook advertisements. |

The projects were often aimed at and involved different age groups. For example, Astro Academy is aimed at secondary-age children, while the Space Diaries are targeted at primary-age children, and the Planetarium shows are appropriate for all ages including adults. The projects also cover a range of different science topics. Some are linked directly to the experiments that took place on the ISS or to Tim Peake's experiences in space (including TimPix and Cosmic Classroom). Others have broader links to aspects of the school science curriculum (e.g. Mission X looks at exercise and nutrition). Some also make cross-curricular links (such as One Giant Read) or encourage the development of wider skills (as in the Great British Space Dinners). All of the projects attempt to provide exciting opportunities for participants to engage actively with the Principia mission and in learning about STEM more generally. The full list of associated educational projects and details about each one can be found on the dedicated Principia Mission education website here: https://principia.org.uk/get-involved/#activities.

## Aims of the report

Our brief was to establish the 'reach' of the Principia education programme so far, using the raw data collected by the UK Space Agency. The aims of this research are to:

- Establish the 'reach' of the Principia education programme, in terms of the number of schools and number of young people who have taken part in the projects.
- Identify, as far as possible, patterns of participation in terms of phase of schooling, type of educational establishment and level of student disadvantage, and their geographical distribution and neighbourhood characteristics.
- Map the kind of activities that have the greatest reach, with types of participants, schools and geographical locations

# Methods

## The data provided

The UK Space Agency provided us with names and brief descriptions of 34 projects in the programme, each of which is described in more detail in the Appendix. However, the European Space Education Resource Office (ESERO) School Grants project is effectively an extension of ESERO Tim Peake Primary Project (TPPP), based in the same schools, and so the two are treated as one project for the ensuing analyses. Where two sets of distinct data were provided for what was named as the same project these are treated as separate projects. For example, two sets of data were provided for Astro Pi separately (Astro Pi and Sonic Pi/MP3 competition) and three for Into Film (Into Film screenings, Into Film competition, and Into Film, talks and workshops). No data and no description were received for two of the projects: BBC Wiltshire and Zero Robotics. This report is based on the remaining 32 distinct projects for which we have data.

Each of the 32 projects maintained its own records of activities and participation, and these were provided to us via the UK Space Agency while projects were running or after they had been completed. The programme had no agreed approach to recording or presenting participation. In practice, the data recorded and provided by the 32 different projects differed widely in terms of details. Several projects did not provide data on the number of participants – just the school or other establishment in which the project took place, or from which the participants were recruited. None of the projects provided data on individual participants. These inconsistencies and missing details made the analysis more difficult, and the results less secure. This means that the 'reach' of the programme can only be our best independent estimate.

Of the 32 projects with data, 24 provided lists of schools or other settings and organisations along with numbers of participants. Although these data were sometimes invalid or incomplete (see below), they are the most valuable. Some of these provided further details such as the age or year group of participants (e.g. Rocket Science). Another two projects provided lists of schools or other settings but not the numbers of participants. The remaining projects provided less detail than this – sometimes for the very good reason that the project was of a different type, such as a website gauged in terms of the number of hits, or an educational resource measured in terms of the number of schools it was sent to without knowing whether the resource was used or not.

In future, it would be better to build ideas for evaluation into the design and rollout of such projects. As a minimum, all projects should sign up to consistent data recording and reporting standards as a condition of their funding.

## Finding a total

The headline figure for programme reach is the total number of participants across all 32 projects for which we have any data. Without individual registrations it is not possible to eliminate entirely the duplication of participants across different projects (where an interested individual has participated in more than one). As a substitute we have done three things:

First, we totalled separately the figures that are not measured in terms of participants – such as website downloads or resources sent to schools.

For the other figures, where the same school (or organisation) appeared within a project more than once this was because different year groups participated or the project ran for successive years with the same age group. We collapsed these entries to create a total for that project in that school.

Where the same school (or organisation) appeared across different projects, and it was clear that different year groups participated, nothing was done. If it was clear that same year groups participated in different projects, or it was not clear whether it was the same year groups, we had to estimate the overlap between projects (to avoid over-estimating the overall reach of the programme). Where we did not know the identities of the schools, we estimated the level of overlap with other schools by using the known level of overlap for the schools whose identities we did have. Estimating this overlap required knowledge of the size of each participating school or organisation.

## Identifying the schools

For almost all the projects no school unique reference numbers (URN) were collected. Instead we were given lists of names of schools and organisations, along with postcodes for 24 of the projects. Some schools had no names and some had no postcodes. The postcodes were needed to identify the schools since the names of schools are often not unique. There are hundreds of St Mary's, for example. For the most part, we used Edubase (a publicly available database of schools and their characteristics), and matched institutions via names and postcodes where these were available. Edubase only contains information about schools in England, some offshore islands (e.g. Jersey and Guernsey), and a few schools in Wales. Some of the England postcodes did not identify an institution or match with an Edubase record. For the other UK countries of Northern Ireland, Scotland and Wales, participant institutions are simply totalled by region. Institutions outside the UK are simply totalled. The list of institutions is therefore not complete. There were also participants registered as being educated at home, or by parents, and no school information is available for these.

One of the advantages of linking to Edubase to determine the size of each school/college is that it also leads to information on the type of school (independent, academy, technological college, community school), phase of schooling (primary, secondary, sixth form), its location (region, urban/rural), and levels of potential disadvantage (assessed by proportion of pupils with free school meal eligibility, and English as an additional language). We analysed participation in terms of all of these characteristics including size. This enabled us to go beyond reach, and consider also the kinds of participants in the overall programme as far as possible from these limited data. We did this by comparing the participating schools with the equivalent figures for all schools in England.

Pre-primary, nursery and primary schools are counted as primary phase. Middle and all-age schools are classified as primary or secondary based on the ages of the pupils. All education institutions with only students above Year 11 (e.g. further and higher education and sixth form colleges) are classified as post-secondary. Academy schools include all autonomous schools (Academy Sponsor Led, Academy Converter, Foundation and Free schools). Voluntary schools include both Voluntary Aided and Voluntary Controlled. We have classified special schools, pupil referral units, hospital schools and alternative education units as 'Other' provision. Where the institution is unknown or the postcode is missing or clearly wrong, we total participation in a 'not known' category.

Nationally there are a total of 26,912 schools in the database. Of these, 70% are primary and 13% are secondary schools. The 'others', including special schools, independent and some Welsh establishments make up 16%. For comparisons of school participation in the different projects, we compared only schools in England for a number of reasons. First the majority of school participants were from England. Second, Edubase does not include most UK schools outside England, and the national database for the

other devolved administrations had very different classification of school types and even school phase (as in Scotland). However, for projects where the majority of participants came from outside England, as in the 3-Minute Learning project where 87% of participants came from Scotland, we did an analysis of the distribution pattern of the participants in Scotland. It is not possible to do similar things for all projects as others did not include postcodes for Scotland.

For the Cosmic Classroom In-flight call with Tim Peake, we only have information on the latitudes and longitudes of the participants. In this case we used Google maps to work out the location of these places and present the data on a distribution map. This was a very time-consuming and laborious task as there were over 12,000 cases, each one individually searched. Google locations are not always precise and some coordinates pointed to the middle of the Mediterranean Sea, for example.

Many projects provided figures that look like more like estimates than actual participation. For example, estimates were based on class sizes and the number of classes. And several events involved unspecified schools and pupils, such as visitors to the National Science Centre and the outreach day. There is no way of estimating overlap for these, and so the final figures are likely to be an over-estimate of reach, in this regard.

For projects like Destination Space where a large number of participants are from the public, we analysed participation by schools and the public separately. Since not all registrations came from schools (there were individuals, charity organisations and youth groups), we analysed where each registration came from to ascertain the geographical spread of interest.

## Estimating the overlap between projects

To estimate the likelihood that an individual listed in one school participated in more than one project, where the school was part of two or more projects, we used a very simple form of the capture, mark, recapture technique from ecology (Gorard 2003). To use this technique we have to first determine if the pupils from the same school participating in the different projects are the same pupils. Where it is clear that the pupils are from different year groups these pupils will be counted as separate individuals. However, where it is not clear that different year groups were involved, the probability of any one individual participating in that school is computed as the number of participants in each project divided by the number of eligible pupils. The chance of any one individual being part of two projects is then defined as the product of the probabilities of participation for each school. Where we do not know a key piece of information, we have to assume no overlap. Where it appears that the whole school took part in one activity, no addition is made for other activities. Otherwise, the total for each school is computed as the largest number in one project plus 20% of the remaining participants. Fractions (of participants) are ignored).

## Difficulties with identifying schools

Some schools were sent to us listed by their more common names which were not the same as those registered in the national database. In some projects there were as many as 25% of postcodes which were incorrect. Many had typographical errors, e.g. PO2 written as P0Z, FY4 written as FYA, YO31 was listed as TO31 and so on. Sometimes one letter was missing. Some schools were listed as [the name of a school] and other schools. It is impossible to know what the other schools are. It is also not always clear whether the schools were only venues for an event or were schools where the participants came from.

In the Rocket Science data, there were over 142 schools which could not be located with the postcode given. This represents 5,231 young people. There were a number with postcodes labelled as 'tbc' (to be confirmed). About 25% of postcodes in the Conferences project were incorrect. In such cases we used the names and locations of the schools to determine the school. In a number of cases this was not possible as the name of the school was incomplete or too vague.

In the Into Film competition, only some of the school names were given; the rest just consisted of the names of towns and their postcodes. In a handful of cases the postcodes were those of schools, but in most of the cases the postcodes were not related to schools. There was no way of telling whether the postcodes were wrong or whether the entries did not come from schools. We used postcode finders to check if they were schools or not.

Overall, there were 33,090 cases with no school name (usually just a post code), 16,826 cases were home-educated, 397 were individual participants not affiliated with schools or any organisations or groups (just listed as individuals), and a further 662 schools were listed as having no participants or zero participants.

# Headline findings

## Overall reach

Where projects have listed (or at least estimated) the number of participants by institution or organization and the estimated overlap is removed, we judge that 1,140,502 distinct children and young people have taken part in this programme. There were further projects with no school level data but where assumptions can be made about the overall number of participants. Including these projects the total number is estimated as 1.6 million. This is equivalent to over 15% of the total UK school population at any one time.

Our best estimate is that approximately 9,894 schools would have been involved in the Principia mission education programme so far.

In our estimation we made a number of assumptions for the following projects:

For the Royal Institution lectures, it is estimated that there were 480 uses of the video clips. Assuming a class size of 30 this would mean that the lessons would have been used with approximately 14,400 students. For the Great British Space Dinners, we were told that there were 523 entries received from 110 schools involving over 2,000 people across all age groups. One Giant Read has so far involved 58,715 page views for their website, and 6,465 page views of Principia specific content. Cosmic Classroom reported over 12,000 registrations with an estimated 400,000 participants. 13,000 copies of Astronaut handbooks have been sent out to schools and other addresses. 2,000 copies were made of the Institute of Physics Marvin and Milo. In the STARs project, 25 scientists from 13 different institutions delivered a total of 72 talks and workshops within both school settings and home education settings. Teacher evaluation forms were distributed following the project although only 15 were received back. From these 15 forms, it could be determined that 1020 children (490 boys and 530 girls) participated in the STARs projects. Extrapolating these numbers across the full cohort of schools and participant groups involved in STARs has led the UK Space Agency to estimate that over 4,000 children were engaged.

The total number could be even higher than 1.6 million as there were 241 schools listed with no participants and a further 421 with zero participants. These could be where registrations were made by schools or adults and no pupil numbers were known.

## How successful is the programme in reaching out to the general school population?

Note that the following findings focus on those sites covered in Edubase (see above), the 25 projects for which we have the appropriate participant data, and they involve all participants without removing overlap.

In general, the Principia education programme has been successful in attracting schools and participants from a range of age groups (Figure 1), in reasonable proportion to the different phases of schools of (Table 2).

**Figure 1: Participation by phase of schooling**

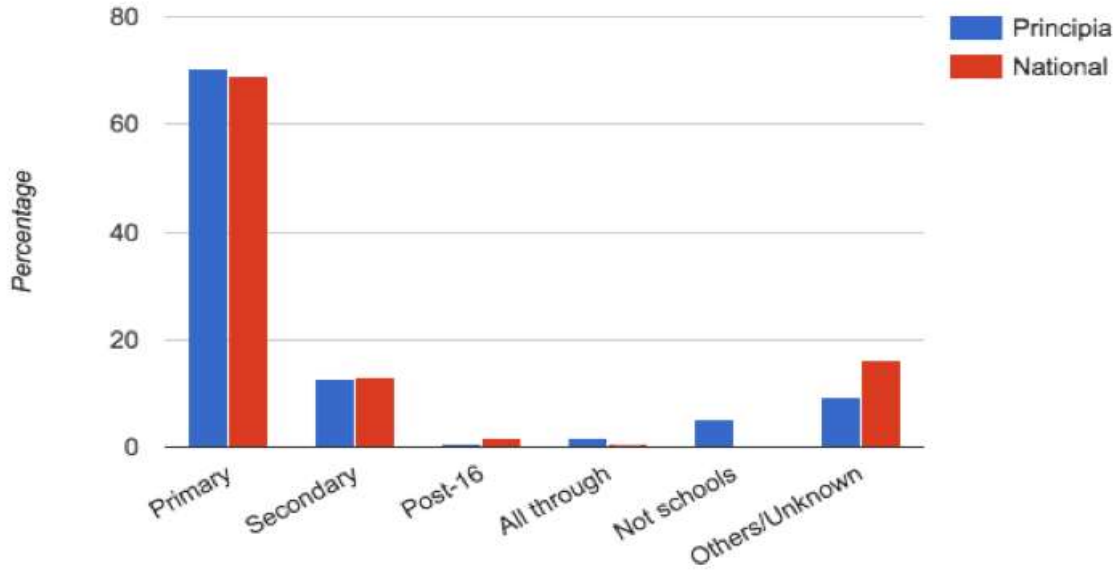



**Table 2: Participation by phase of schooling**

| **Phase of schooling** | **Number of sites** | **Percentage** | **Percentage in England** |
|---|---|---|---|
| Primary | 18696 | 69 | 68.9 |
| Secondary | 3447 | 13 | 12.9 |
| Post-16 | 156 | 1 | 1.6 |
| All Through | 460 | 2 | 0.5 |
| Not schools | 1361 | 5 | - |
| Others/Unknown | 2511 | 9 | 16.1 |
| **Total** | 26,631 | 100 | 100 |

The Principia education projects have also been successful in reaching a wide range of educational establishments (Figure 2). The apparent under-representation of academies and autonomous schools may be partly due to ongoing changes in the labelling of schools. Aside from that, the kinds of schools involved in the Principia projects are in line with those in England (see Table 3).

**Figure 2: Participation by types of schools**

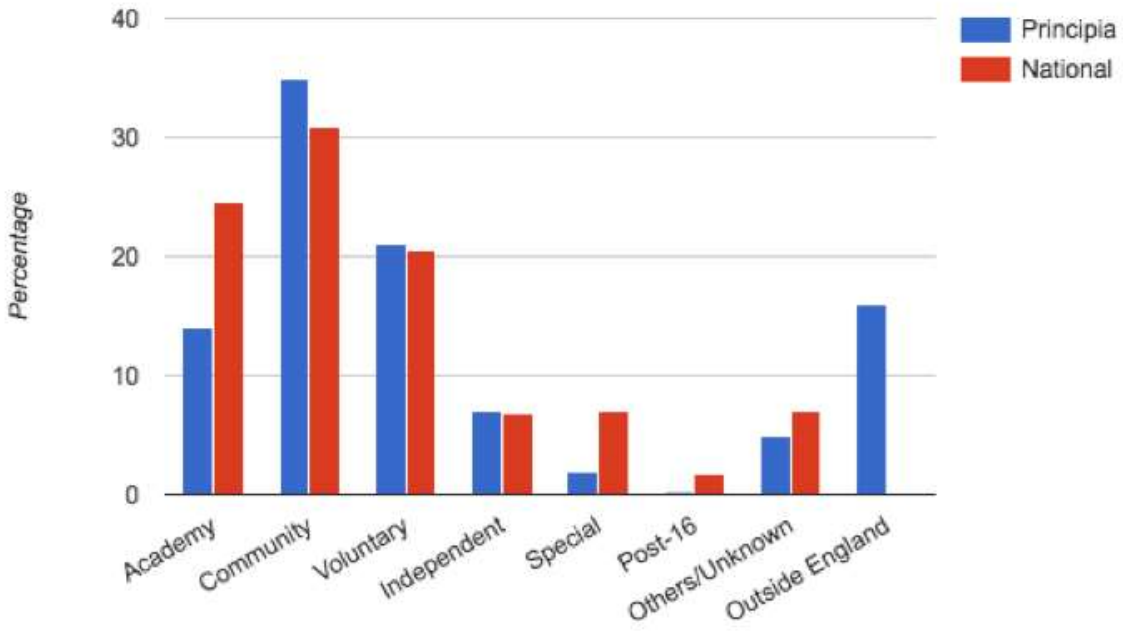


**Table 3: Participation by types of schools**

| Types of schools | Number of schools | Percentage | Percentage in England |
|---|---|---|---|
| Academies & autonomous schools | 1,892 | 14 | 24.6 |
| Community | 4,860 | 35 | 30.8 |
| Voluntary | 2,883 | 21 | 20.5 |
| Independent | 930 | 7 | 6.9 |
| Special | 337 | 2 | 7.0 |
| Post-16 (HE & FE) | 32 | 0.2 | 1.8 |
| Others/Unknown | 652 | 5 | 7.0 |
| Outside England | 2,265 | 16 | - |
| **Total** | 13,851 | 100 | 100 |

Note: Outside England includes schools in Scotland, Wales, N Ireland and those outside UK

Some projects were more popular with younger children while others appealed to older pupils (see Table 4). This could be either because of the nature of the activities or because they were aimed at specific age groups of children/school phases. Note that some projects were not suitable for other age groups – for example careers advice events were not particularly relevant for primary school age children.

## Projects that were more popular with primary schools (or targeted at primary school children)

Rocket Science

Earth Observation Detective

Destination Space

Team Tim shows

IntoFilm screenings

IntoFilm competition

British Association of Planetaria

ESERO Tim Peake Primary Project

Mission X

Cosmic Classroom In flight call

Novium Museum Tim Peake exhibition

Space Diaries

Astro Science Challenge

3-Minute Learning was more popular with primary schools and all-through schools. The latter are schools with both primary and secondary phases. Presumably most of the participants came from the primary division of the all-through schools.

## Projects that were particularly popular with secondary schools (or targeted at secondary school children)

IntoFilm Talks and Workshops

I'm an astronaut, get me out of here

Amateur Radio on the ISS (ARISS) calls with Tim Peake

Astro Academy: Principia

TimPix

Mission Starlight

## Projects that were equally popular or which attracted schools of all phases

Principia Schools conferences

Astro Pi

Astro Pi: Sonic Pi/MP3 competition

Space to Earth

Great British Space Dinners

STARS

**Table 4: Proportion of schools participating in each of the projects**

| Name of projects | Primary | Secondary | Post-16 | All through | Nursery/child care centre | Not schools | Others/Unknown |
|---|---|---|---|---|---|---|---|
| Rocket Science | 60% | 13% | 1% | 3% | 5% | 14% | 5% |
| Earth Observation Detective | 72% | 26% | 0% | 2% | 0% | 0% | 0% |
| Destination Space | 92% | 8% | 0% | 0% | 0% | 0% | 0% |
| Team Tim shows | 82% | 4% | 0% | 5% | 0% | 9% | 0% |
| 3Minute Learning | 33 | 3 | 0% | 52% | 0% | 0% | 13% |
| Into Film screenings | 68% | 15% | 2% | 5% | 0% | 0% | 11% |
| IntoFilm competition | 56% | 30% | 14% | 0% | 0% | 0% | 0% |
| Into Film talks and workshops | 0 | 78% | 15% | 3% | 0% | 5% | 0% |
| Principia Schools Conferences | 36% | 27% | 0% | 11% | 0% | 0% | 27% |
| I'm an astronaut, get me out of here | 22% | 66% | 1% | 8% | 0% | 0% | 2% |
| Astro Pi | 31% | 38% | 0% | 0% | 0% | 31% | 0% |
| Sonic Pi &MP3 competition | 46% | 54% | 0% | 0% | 0% | 0% | 0% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Amateur Radio on the ISS (ARISS) calls | 10% | 60% | 0% | 20% | 0% | 10% | 0% |
| British Association of Planetaria | 83% | 9% | 0% | 8% | 0% | 0% | 0% |
| ESERO TPPP & Grants | 98% | 2% | | | | | |
| Mission X | 80% | 7% | 0% | 4% | 0% | 9% | 0% |
| Astro Academy | 0% | 61% | 23% | 16% | 0% | 0% | 0% |
| TimPix | 1% | 76% | 3% | 20% | 0% | 0% | 0% |
| Cosmic Classroom | 76% | 15% | 0% | 0% | 0% | 0% | 8% |
| Space to Earth | 44% | 30% | 5% | 6% | 0% | 0% | 15% |
| Great British Space Dinners | 40% | 33% | 0% | 0% | 0% | 27% | 0% |
| Space diaries | 53% | 1% | 0% | 0% | 0% | 0% | 46% |
| Novium museum | 89% | 0% | 0% | 0% | 0% | 11% | 0% |
| Mission starlight | 21% | 70% | 9% | 0% | 0% | 0% | 0% |
| STARS | 54% | 43% | 0% | 4% | 0% | 0% | 0% |

The Principia education programme has also been particularly successful in targeting schools with high levels of disadvantaged pupils in terms of proportion of pupils eligible for free school meals (FSM) and proportion of pupils whose first language is not English (EAL). On average the schools in twelve of the 20 projects with appropriate data were above the national average in terms of proportion of pupils eligible for free school meals. And the schools in eleven of the 20 projects were on average above the national

average for EAL (Table 5). This suggests that the Principia education programme has been successful in reaching disadvantaged schools. The schools involved in the programme were not just those with advantaged intakes or high performing schools. Of the 15 with data on school size, 13 of them (87%) involved larger than the average school in England.

**Table 5: Projects with schools above national average on indicators of disadvantage**

| **Name of projects** | **Schools above national average for Free School Meals (FSM)** | **Schools above national average for EAL** | **Schools above national average size of schools** |
|---|---|---|---|
| Rocket Science | Y | N | Y |
| Earth Observation Detective | Y | N | Y |
| Destination Space | Y | Y | N |
| Team Tim shows | Y | Y | Y |
| 3Minute Learning | N | Y | Y |
| IntoFilm | Y | Y | Y |
| IntoFilm competition | Y | Y | Y |
| IntoFilm talks and workshops | Y | N | N |
| Principia Schools Conferences | N | Y | Y |
| I'm an astronaut, get me out of here | Y | N | |
| Astro Pi | N | N | - |
| Sonic PI &MP3 competition | - | - | - |
| Amateur Radio on the ISS (ARISS) calls | Y | N | Y |
| British Association of Planetaria | Y | Y | Y |

| | | | |
|---|---|---|---|
| ESERO TPPP & Grants | N | N | Y |
| Mission X | Y | Y | Y |
| Astro Academy | N | y | Y |
| TimPix | N | N | Y |
| Cosmic Classroom | No data | No data | No data |
| Space to Earth | Y | Y | - |
| Great British Space dinners | No data | No data | No data |
| Space diaries | No data | No data | No data |
| Novium museum | No data | No data | No data |
| Mission starlight | N | N | |
| STARS | N | Y | |

## How widespread is the Principia education programme?

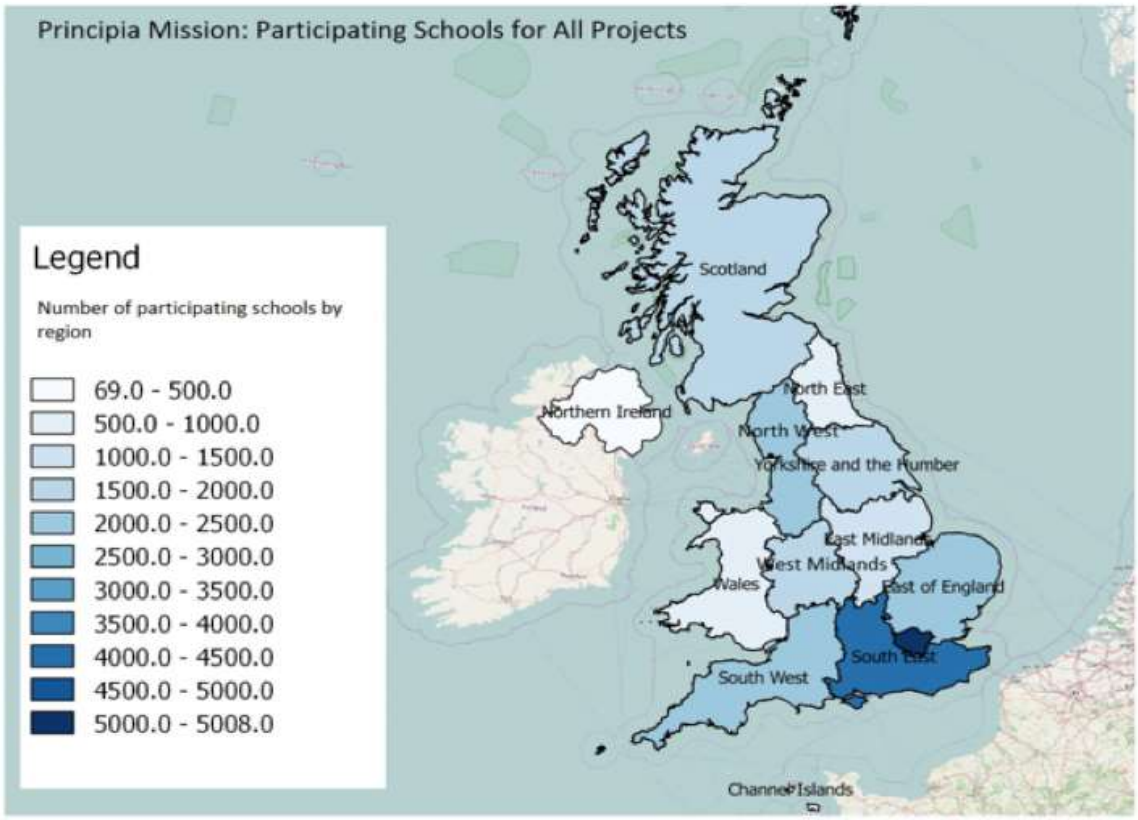
The Principia education programme can be said to be fairly successful in reaching out to schools throughout the UK, reflecting the proportion of schools in different geographical regions (Table 6).

**Table 6: Geographical distribution of schools in the Principia education programme**

| Geographical regions | Number of schools | Percentage | Percentage for England |
|---|---|---|---|
| East Midlands | 1,404 | 5 | 8.3 |
| West Midlands | 1,895 | 7 | 10.1 |
| North East | 714 | 3 | 4.5 |
| North West | 2,488 | 10 | 13.3 |
| East of England | 2,395 | 9 | 10.7 |
| London | 5,008 | 19 | 12.1 |
| South East | 4,482 | 17 | 15.9 |
| South West | 2,395 | 9 | 8.9 |
| Yorkshire & the Humber | 1,582 | 6 | 9.2 |
| Scotland | 1,868 | 7 | - |
| Wales | 976 | 4 | 6.2 |
| N Ireland | 356 | 1 | |
| Channel Islands | 69 | 0.3 | |
| Others/Unknown | 449 | 3 | 0.6 |
| **Total** | 26,081 | 100 | 100 |

Figure 3 shows that London and the South East are where schools have been most actively involved. Several schools were involved in a number of projects and since in a number of cases we only know where the schools were from but not the school itself it is not possible to know which school has been double counted for all cases. Therefore the numbers here can only represent regions where there was active participation, and not the actual number of schools.

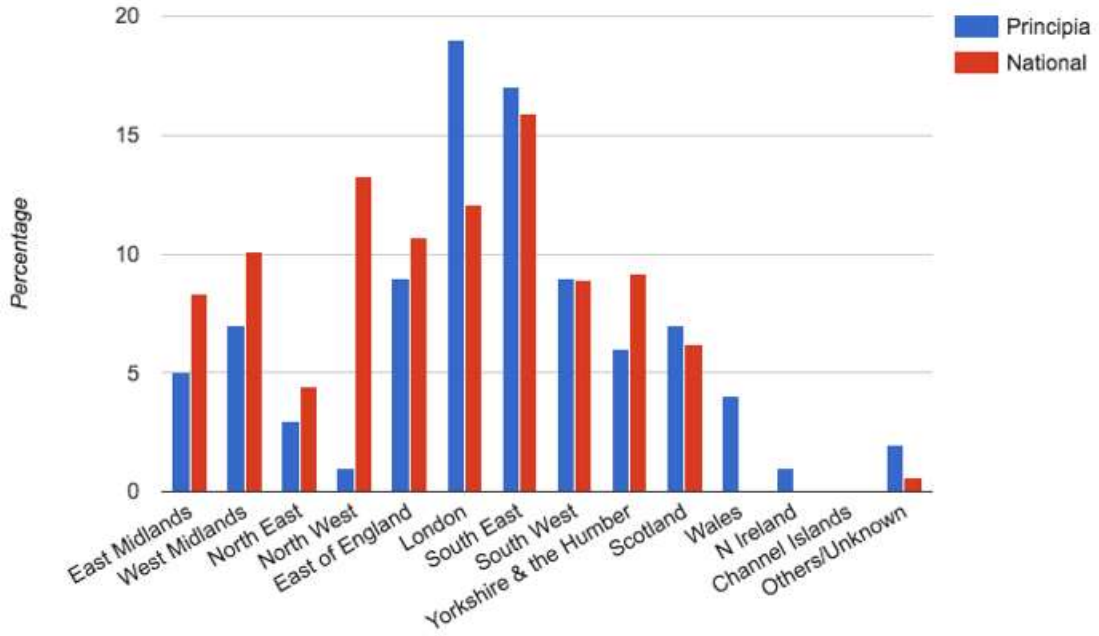
**Figure 3: Regions where there was most active participation by schools**




Note: The number of schools here is more than the total number of schools for the whole project (9,894). This is because the number here includes all the schools that took part in the 34 individual projects combined. Since a number of schools took part in several projects, the number here includes schools that may be counted more than once.

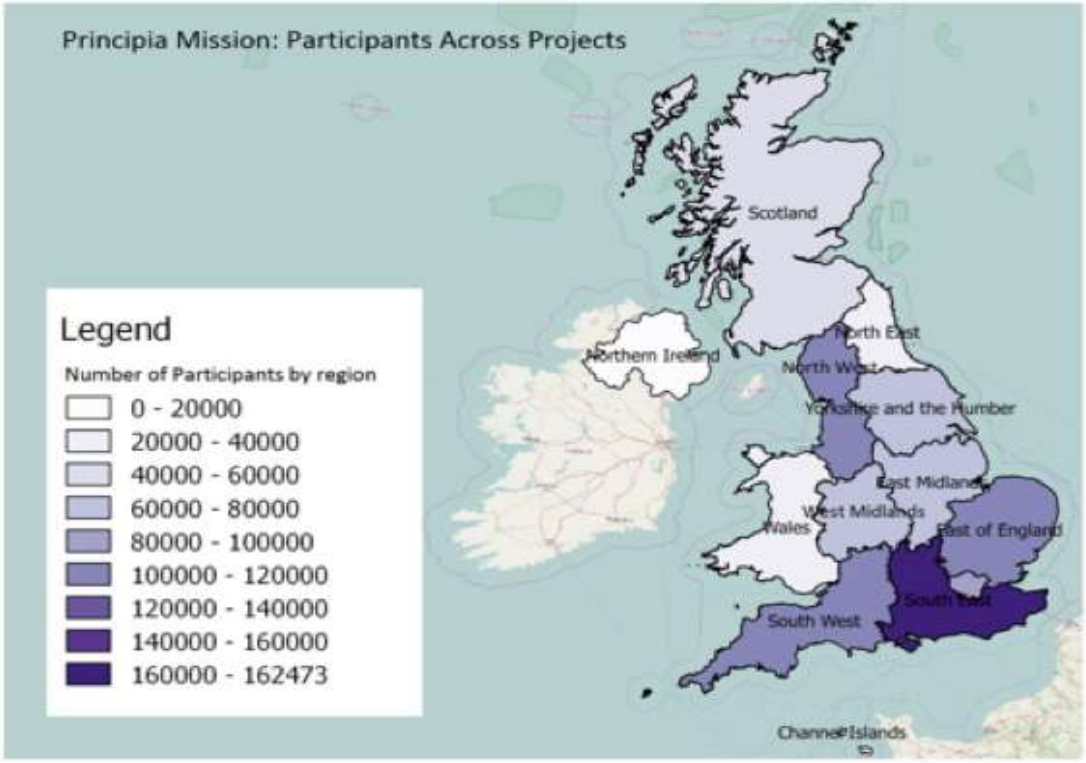
Compared to the national distribution of schools in England, these schools were overrepresented (Figure 4). Although the North East had the fewest number of schools participating in the programme, it is in line with the proportion of schools across England.

**Figure 4: Geographical distribution of Principia education schools compared to the national distribution of schools**




The distribution of participants is very similar to that of schools (Figure 5), suggesting that the number of participants in each region was proportionate to the number of schools, and that it was not the case that schools in some regions were registering very few pupils or that participants were overrepresented in a few schools.

**Figure 5: Geographical distribution of participants in the Principia education programme**

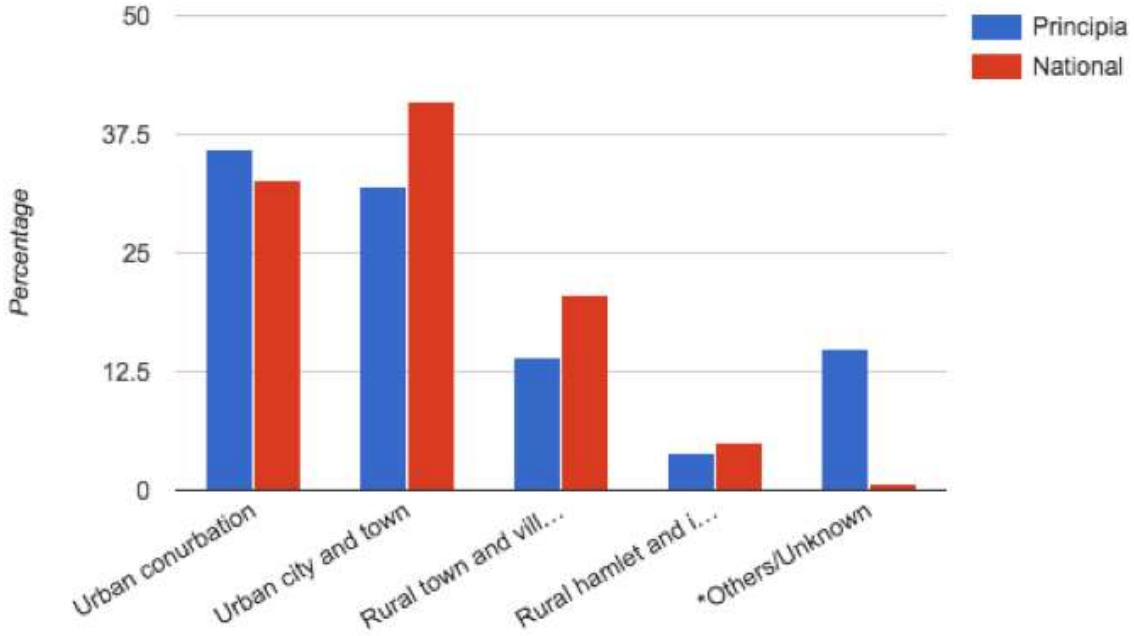



The Principia education programme has also been successful in reaching out to schools in different types of locality. These were broadly representative of the national distribution of schools (Table 7). Schools in large urban areas appear to be slightly overrepresented while those in rural areas were underrepresented compared to the national distribution of schools (Figure 6).

**Table 7: Distribution of Principia education schools by types of locality**

| **Types of locality** | **Number of schools** | **Percentage** | **Percentage for England** |
|---|---|---|---|
| Urban conurbation | 8,839 | 36 | 32.6 |
| Urban towns and cities | 7,910 | 32 | 40.9 |
| Rural towns and villages | 3,420 | 14 | 20.6 |
| Rural hamlet and isolated dwellings | 930 | 4 | 5.1 |
| Others/Unknown | 3,330 | 15 | 0.7 |
| **Total** | 24,769 | | |

**Figure 6: Distribution of Principia education schools by types of locality**



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# Appendix

The appendix provides a more detailed description and analysis of reach for each project.

## ROCKET SCIENCE

This was a nationwide experiment, with about 600,000 people taking part, run with the Royal Horticultural Society. On 3 September 2015, one million (2kg) tiny rocket seeds (*Eruca sativa*) were launched into space to begin a six month stay on board the ISS. Over 8,600 schools and groups across the UK signed up to receive a packet of these seeds and were given a mission: to grow the seeds once they returned alongside an identical packet of seeds that had remained on Earth. Unaware which packet contained the space seeds, these young space biologists nurtured their seedlings between April and June 2016, taking specified measurements and carefully recording their data.

The aim of this experiment was to investigate whether space travel affected the germination and growth of the rocket and whether this could help us understand more about how astronauts might be able to grow their own food on long space missions or even another planet in the future. You can read more about it here: https://principia.org.uk/activity/rocketscience/

Rocket Science was one of the largest projects involving over 8,000 schools/registrations all over the UK including those from the Channel Islands (Guernsey and Jersey), England, Wales and Scotland. The project attracted a wide range of students of all age groups from a wide range of schools, including Academies, Community schools, Independent schools, Nurseries, Pupil Referral Unit and Special schools.

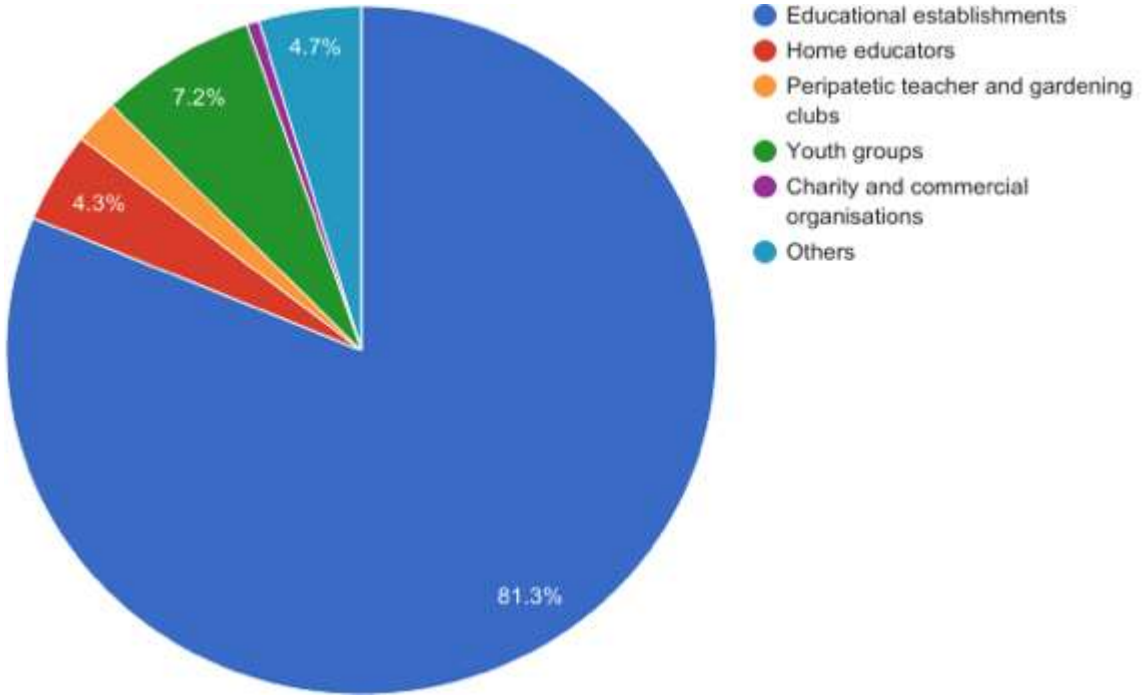
We analysed the data in several ways, first by phase of schooling, types of establishment and age of participants. We think this is the most sensible way since not all participants were registered by schools.

A total of 8230 registrations for Rocket Science were received from a wide range of establishments. Schools and other educational establishments made up the largest group. There were about 7,073 schools represented here in this project alone. These included community schools, academies and autonomous schools, voluntary, independent and *special schools. The next largest group was the youth clubs. These included uniformed organisations such as the brownies, scouts and the girlguides. Registrations also came from a large group of home educators and peripatetic teachers (who were also gardening club leaders), gardening clubs, commercial organisations, charity groups and early years provisions (playgroups and childcare centres). The ‘Others’ include events held at universities, public places such as museums, science clubs and societies and Spaceflight UK, which alone had 5000 participants.

*Because of the small number of special schools and PRUs, we have included these special unit schools as special schools. These include schools for special educational needs, pupil referral units (PRU), hospital schools and other alternative schools

Figure 7 gives a breakdown of the kind of establishments registrations came from.

**Figure 7: Rocket Science: Types of establishments**




The majority of the registrations for Rocket Science came from educational establishments. The next biggest group is the youth clubs. The latter made up 7% of all registrations.

## Who are the participants in the Rocket Science project?

Over half of the participating schools and close to three-quarters of the participants in the Rocket Science project were from the primary school sector.

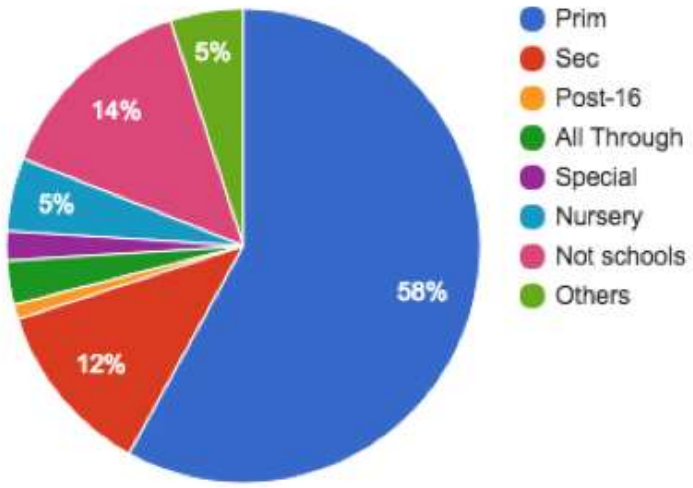
**Table 8: Rocket Science- School Phase**

| School Phase | Number of schools | | Participants | |
|---|---|---|---|---|
| Primary | 4795 | 58.2% | 427713 | 72.6% |
| Secondary | 1015 | 12.4% | 64513 | 11.0% |
| Post-16 | 45 | 0.5% | 1570 | 0.3% |
| All Through | 229 | 2.7% | 14262 | 2.3% |
| Special schools (PRU and special schools) | 181 | 2.2% | 6484 | 1.1% |
| Nursery/Childcare centres | 423 | 5.2% | 12525 | 2.2% |
| Not schools | 1157 | 14.1 | 37632 | 6.5% |
| Others | 385 | 4.6 | 24955 | 4.1% |
| **Total** | 8230 | 100.0% | 589654 | 100.0% |

The total of 8230 does not represent the number of schools as it included individual registrations by home educators, parents and childminders as well as other organisations, charity and youth groups.

Post-16 includes sixth form colleges, HE and FE colleges and Universities. All Through refers to schools with both primary and secondary or all phases of schooling right up to 6th forms. Primary schools with infant and junior schools are counted as one school even though they are registered separately. However, where it is clear that the infant and junior schools are separate schools with their own Ofsted ratings, these are counted as separate schools. 'Others' refers to schools where we have no information, for example, schools in N Ireland, Wales and Scotland. However, where possible we try to locate these schools to establish their phase education. 'Not schools' includes registrations by individuals, e.g. childminders or other organisations and youth clubs other than through the schools. For example, we have registrations for pupils from peripatetic teachers, youth groups (e.g. Brownies, Scouts, Beavers, Sea Cadets and Cub Pack), Charity groups (e.g. rotary clubs, playgroups), local authority councils and housing associations, gardening clubs and other commercial organisations. For this group we have no information about the age of participants

**Figure 8: Rocket Science - Registrations by school phase**



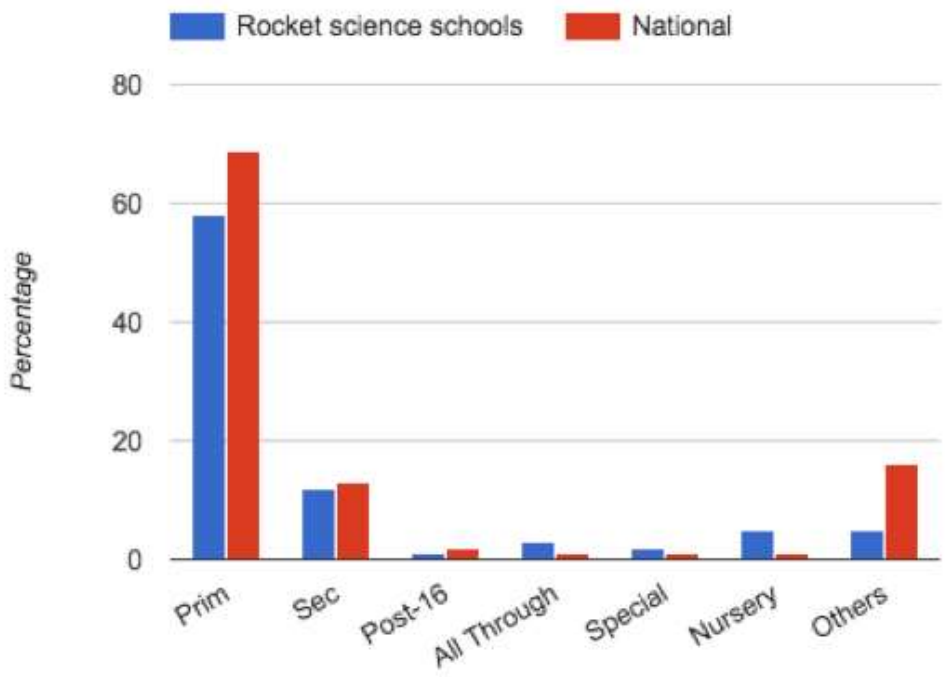

Note: 'Others' refers to schools outside England or where information is unknown. 'Not schools' refers to registrations by individuals or youth groups outside school

The pie chart (Figure 8) shows that over half of all registrations (58%) came from primary schools. The 'Not schools' refers to those who registered the children for the project by individuals or groups other than the schools. This group represented 20% of all participants.

Of note is the wide range of organisations which have shown interest, and the wide age group of the participants, suggesting that the project has a wide appeal. The graph below shows the proportion of registrations represented by children from different phases of schooling.

Compared with the national picture, the proportionate contribution of the different phases of schooling is very similar to that of the national figure, as shown in the figure below.

**Figure 9: Comparison of Rocket Science schools with schools in England**




Rocket Science participants were largely from Community schools. This is not surprising given that such schools form the largest proportion of schools, particularly primaries. What is interesting is the range of schools participants came from. We have close to 13,000 participants from Special Schools including 2,500 from Pupil Referral Units. Interestingly the number of academies is not as high as expected. This is most likely a case of classification. 64% of secondary schools in England are now academies (including free schools and UTC). Local authority schools or Community schools make up 35%. In the primary sector a large proportion (82%) are still under local authority control, but many have recently converted to academies but are still classified as Community schools in the government database[MG7] . Only 18% of primaries are currently academies.[MG8]

Academies include Academy Converter, Academy Sponsor Led, City Technology, Free schools and University Technological Colleges (UTC), Foundation and other autonomous schools. Special school includes PRU units and alternative schools.[MG9] Nursery includes child care centres.

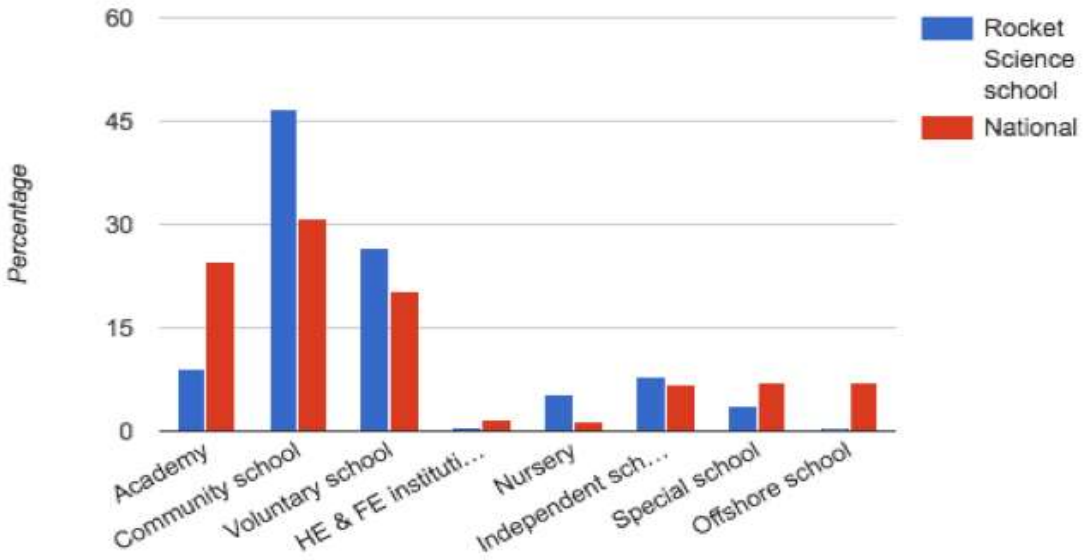
The number of special schools is higher than in the previous table because some primary and secondary schools are also special schools. These were not included in the previous counts. Only educational establishments in England are considered as the classification of the types of schools for the other devolved administrations is slightly different.

**Table 9: Types of educational establishments for England only**

| Types of schools | Number of schools | | National% | Number of participants | |
|---|---|---|---|---|---|
| Academy | 535 | 9% | 24.6 | 47216 | 1.6% |
| Community school | 2763 | 46.6% | 30.8 | 2673798 | 92.3% |
| Voluntary school | 1574 | 26.5% | 20.5 | 122424 | 4.2% |
| HE and FE institutions | 28 | 0.5% | 1.8 | 896 | 0% |
| Nursery | 327 | 5.5% | 1.5 | 9869 | 0.3% |
| Independent school | 467 | 7.9% | 6.9 | 26559 | 0.9% |
| Special school | 220 | 3.7% | 7.0 | 13225 | 0.5% |
| Offshore school | 21 | 0.4% | 7 | 1703 | 0.1% |
| **Total** | 5935 | 100.1% | | 2895690 | 100% |

Note: Data of schools is taken from the DfE School Level Censes and Edubase.

**Figure 10: Comparison of Rocket Science schools with all schools in England**



Schools taking part in Rocket Science are fairly representative of the types of schools in England. Nurseries and Independent schools were slightly overrepresented. It is interesting to note that close to 10,000 participants came from nurseries and child care centres, catering to children under 5.

To see how representative Rocket Science schools are in terms of the level of disadvantage, we looked at the proportion of free school meal children and the proportion of EAL (English as an Additional Language) children in these schools and compared them with the national average.

Schools participating in Rocket Science tended to be similar to the national average in terms of levels of disadvantage (Table 10). The slight differences may be due to missing data where schools could not be found.

**Table 10: Rocket Science schools - Levels of disadvantage**

| Indicators of disadvantage | Rocket Science schools (%) | National average (%) |
|---|---|---|
| %FSM | 13.8 | 13.3 |
| %EAL | 12.3 | 13.0 |
| School size | 419 | 350 |

Note: Only schools on the School Census are used for calculation for the national average. Independent schools and those in Scotland, N Ireland and Wales are not included in the calculation as no data is available for these schools. Also pupils registered by Others (e.g. childminders, peripatetic teachers of their youth clubs) may also not be included if the pupil data is unknown.

## Where do Rocket Science participants come from?

The project is well-targeted, drawing participants from across the whole of UK. Schools, individuals and organisations from England, Scotland, Northern Ireland, Wales, Guernsey, Jersey and the Isle of Man were represented. However the highest number of registrations came from the South East accounting for 17% of total registrations (Table 11). The North West, South West and the East of England together accounted for over 30% of all registrations. This is not surprising since these areas have proportionately more schools than the other regions. On the whole, schools participating in Rocket Science are representative of the national figure.

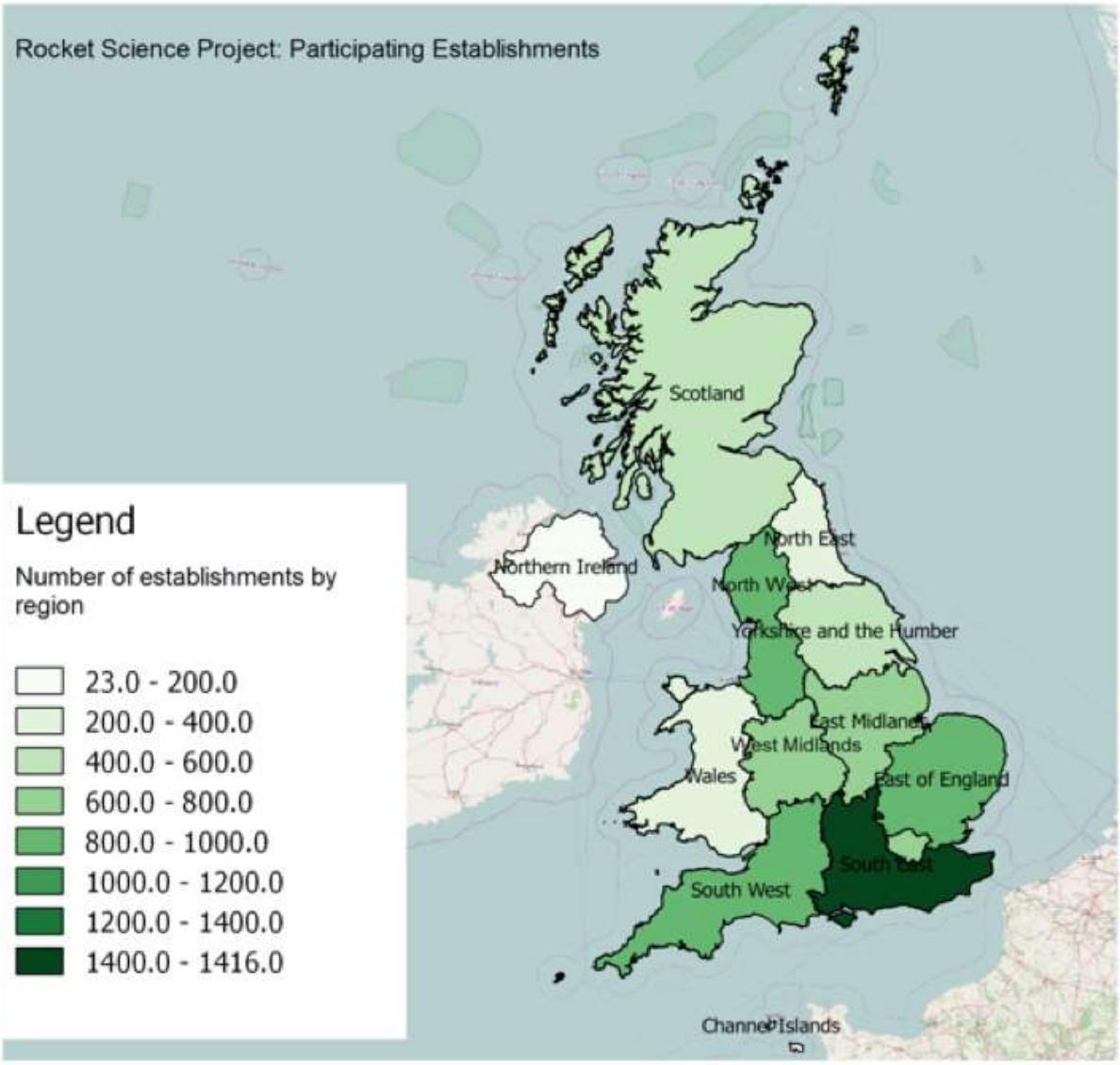
**Table 11: Geographical distribution of Rocket Science registrations and participants**

| **Geographical regions** | **Number of schools/registrations** | | **Number of participants** | |
|---|---|---|---|---|
| East Midlands | 630 | 8% | 45942 | 8% |
| West Midlands | 719 | 9% | 57199 | 10% |
| North East | 271 | 3% | 20607 | 3% |
| North West | 956 | 12% | 72251 | 12% |
| East of England | 940 | 11% | 73004 | 12% |
| London | 713 | 9% | 63404 | 11% |
| South East | 1416 | 17% | 97881 | 17% |
| South West | 930 | 11% | 63526 | 11% |
| Yorkshire and the Humber | 588 | 7% | 41659 | 7% |
| Channel Islands | 24 | 0% | 1734 | 0% |
| N Ireland | 124 | 2% | 6863 | 1% |
| Scotland | 599 | 7% | 29479 | 5% |
| Wales | 312 | 4% | 15897 | 3% |
| Unknown | 8 | 0% | 208 | 0% |
| **Total** | 8230 | 100% | 589654 | 100% |

Note: The number of participants includes those not from schools. The count is for the number of registrations from each region

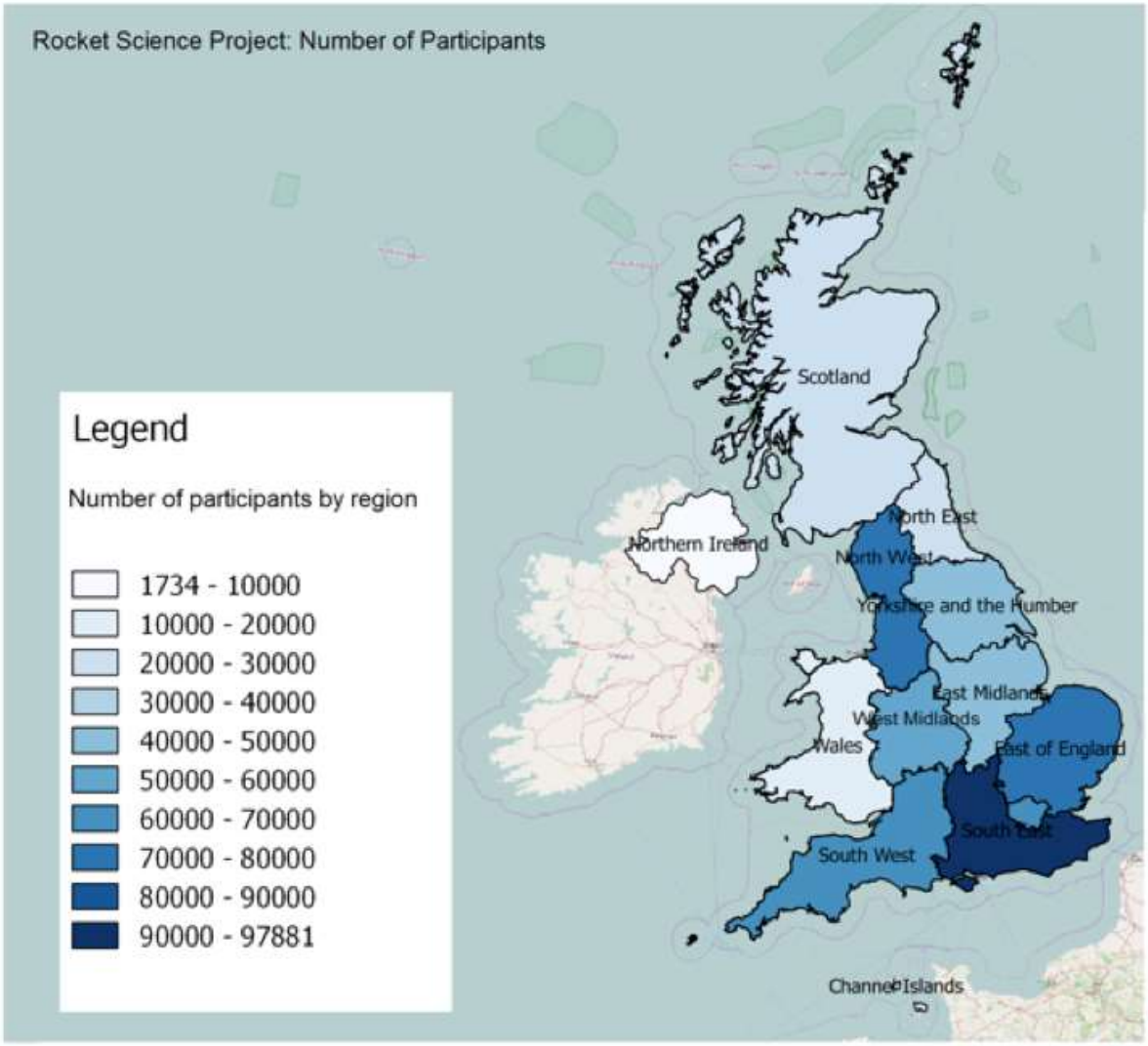
The map (Figure 11) shows the distribution of participating establishments. Most of the registrations came from the South East. By establishments we mean schools, organisations and groups.

**Figure 11: Distribution of participating establishments**




To see if the number of establishments that registered for the project reflects the number of participants (since it is possible that there may be more registrations from one region but with fewer participants either because the schools were small or because these were individual registrations), we did a distribution map for participants as well. Not surprisingly the distribution of participants is very similar to that of distribution for establishments.

**Figure 12: Distribution of participants**




For a fairer comparison, we consider only registrations in England, excluding those in Scotland, Wales and Northern Ireland. Comparing schools in England only (since the national dataset does not have complete information on schools outside England), all the regions were fairly represented. The South East and the South West are two areas that were overrepresented compared to the national distribution of schools. All the other regions are proportionately representative of the distribution of schools in England.

Although not all the registrations came from schools (i.e. as registrations also came from youth groups and home educators), the majority were from schools and all participants were school children.

The number of registrations from each region therefore can be said to be proportionately representative of the number of schools in the region.

Table 12 below shows that the geographical distribution of participants of Rocket Science is fairly representative of that of the national picture.

**Table 12: Geographical distribution of Rocket Science registrations in England compared to the distribution of all schools in England**

| Geographical regions | Number of schools/registrations | % | National (%) |
|---|---|---|---|
| East Midlands | 630 | 9% | 9.1 |
| West Midlands | 719 | 10% | 10.8 |
| North East | 271 | 4% | 4.8 |
| North West | 956 | 13% | 14.3 |
| East of England | 940 | 13% | 11.5 |
| London | 713 | 10% | 13.0 |
| South East | 1416 | 20% | 17.1 |
| South West | 930 | 13% | 9.6 |
| Yorkshire and the Humber | 588 | 8% | 9.8 |
| **Total** | 7187 | 0% | 100 |

Table 13 shows the kind of locality where Rocket Science participants came from. It has to be noted that not all the registrations came from schools, but broadly the distribution is fairly similar to that of the national distribution of schools.

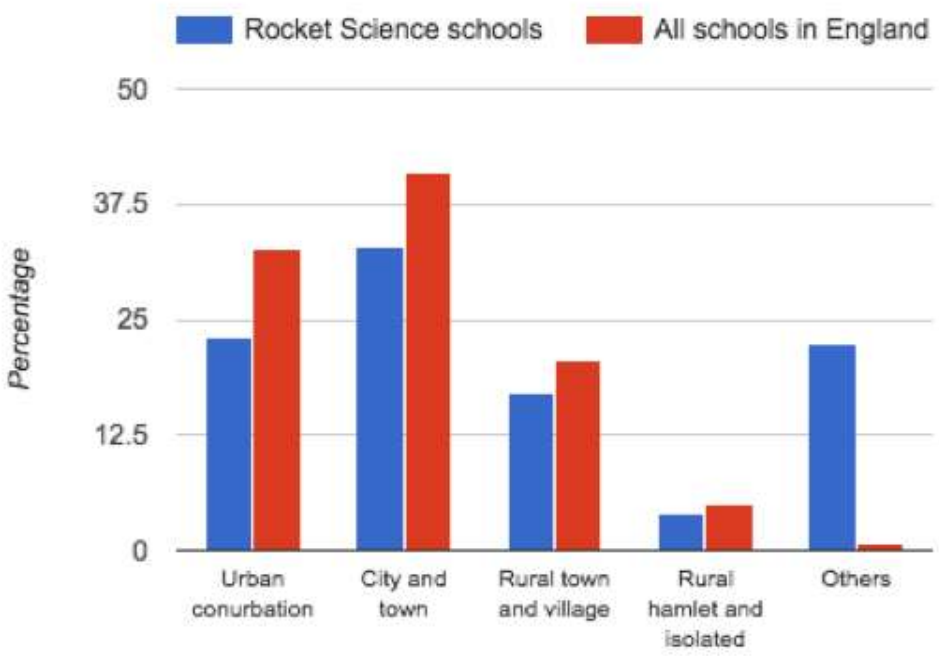
**Table 13: Locality of registrations for Rocket Science**

| **Types of locality** | **Number of schools/registrations** | **%** | **National (%)** |
|---|---|---|---|
| Urban conurbation | 1,873 | 23% | 32.6 |
| City and town | 2,498 | 30% | 40.9 |
| Rural town and village | 1318 | 16% | 20.6 |
| Rural hamlet and isolated | 298 | 4% | 5.1 |
| Unknown | 1409 | 17% | |
| Others | 834 | 10% | 0.7 |
| **Total** | 8230 | 100% | 100 |

Note: 'Others' refers to those where we have no information, including establishments in Scotland, N Ireland and some Welsh establishments. 'Unknown' are those which are not recognised as schools, such as charity groups, youth clubs, public or commercial organisations and home educators.

Most of the registrations from schools in the Rocket Science projects came from the urban cities and towns and urban conurbations (Figure 13). This is to be expected since these areas are where there is the largest student population. And in line with the distribution of schools in England, rural areas and rural hamlets were also represented.

**Figure 13: Types of locality where Rocket Science registrations came from**




## Other registrations not from schools

For a more complete picture we also look at where the entries from outside schools came from. These included entries from childminders, commercial organisations, gardening clubs, youth clubs and home educators.

### Who are these?

Over half of the registrations came from people whose status is unknown. Of the ones that are known, those from commercial organisations and charity groups formed the highest proportion. Together they formed a quarter of the registrations (26%) outside schools.

**Table 14: Rocket Science registrations that are not from schools**

| Other entries outside schools | No. of entries outside schools | % |
|---|---|---|
| Charity | 3473 | 10 |
| Childminder | 2328 | 7 |
| Commercial organisation | 5995 | 16 |
| Gardening club | 557 | 2 |
| Home educator | 2525 | 7 |
| Other institutions | 1010 | 3 |
| Unknown | 20177 | 57 |
| **TOTAL** | 35665 | 100 |

**Where do they come from?**

Most of the entries outside schools came from the East of England and the South East. The area with the lowest number of registrations outside schools is the North East.

**Table 15: Geographical distribution of Rocket Science entries not from schools**

| **Geographical regions** | **Number of registrations outside schools** | **%** |
|---|---|---|
| East Midlands | 2962 | 8.3% |
| West Midlands | 2634 | 7.4% |
| North East | 842 | 2.4% |
| North West | 4333 | 0.0% |
| East of England | 7318 | 20.5% |
| London | 1870 | 5.2% |
| South East | 6203 | 17.4% |
| South West | 4355 | 12.2% |
| Yorkshire and the Humber | 2311 | 6.5% |
| Channel Islands | 21 | 0.1% |
| N Ireland | 258 | 0.7% |
| Scotland | 1733 | 4.9% |
| Wales | 825 | 2.3% |
| **Total** | 35665 | 100% |

# EARTH OBSERVATION DETECTIVE

This was a competition that ran with the National Centre for Earth Observation throughout Tim Peake's mission and participants also received a pack of education resources. In this competition each child who entered had to pick a place on Earth that they thought Tim should photograph from space, and give a reason why, so every entry in this data represents one child.

There were a total of 170 applications, out of these 56 came from schools and 114 were made by individuals, including four tuition centres. Some of the individuals applied for more than one entry. For example one individual in the South East entered nine children for the competition. The number of entries made by schools was 772 and those by individuals and private tuition centres accounted for 137 of the participants. A total of 909 children took part in this competition.

## Who are the participants in the Earth Observation Detective?

The majority of the participants were primary school children (n=731), making up 80% of the total registrations. Of these 26 (3%) were pre-primary children. Secondary school pupils made up 16% of all entries (n= 145). Four of the schools were all-through schools meaning that they have both primary and secondary pupils (Table 16).

**Table 16: Phase of schooling for Earth Observation Detective**

| **School Phase** | **Schools** | | **Participants** | |
|---|---|---|---|---|
| Primary | 122 | 72% | 731 | 80% |
| Secondary | 44 | 26% | 145 | 16% |
| All Through | 4 | 2% | 33 | 4% |
| **Total** | 170 | 100% | 909 | 100% |

The majority of entries were from individuals, so we do not know what kind of schools they represent. Of the entries that came from schools, 20.6% were from Community and Voluntary schools. Independent schools made up the next largest group at 4.7% (Table 17)

**Table 17: Types of educational establishments for Earth Observation Detective**

| Types of schools | Number of schools | % | National (%) | Number of participants | % |
|---|---|---|---|---|---|
| Academy | 6 | 4 | 24.6 | 102 | 11% |
| Community school | 19 | 11 | 30.8 | 232 | 26% |
| Voluntary | 16 | 9 | 20.5 | 203 | 22% |
| Independent school | 8 | 5 | 6.9 | 104 | 11% |
| Special school | 2 | 1 | 7.0 | 20 | 2% |
| Outside England | 5 | 3 | 7.0 | 111 | 12% |
| Others (individual registrations) | 114 | 67 | | 137 | 15% |
| **Total** | 170 | 100 | | 909 | 100% |

Note: 'Others' includes education learning centres and individual entries unaffiliated to schools

Schools involved in the Earth Observation Detective competition have a higher proportion of disadvantaged children in terms of children eligible for FSM than the average schools in England (Table 18).

**Table 18: Levels of disadvantage of of schools which participated in Earth Observation Detective competition**

| | Detective Competition | National average |
|---|---|---|
| %FSM | 16.5 | 13.3 |
| %EAL | 8.4 | 13.0 |
| School size | 427 | 350 |

Note: This table has to be read with caution as we have data for only 30% of the entries. The majority are from individuals whose school affiliations are unknown.

## Where do Earth Observation Detective entries come from?

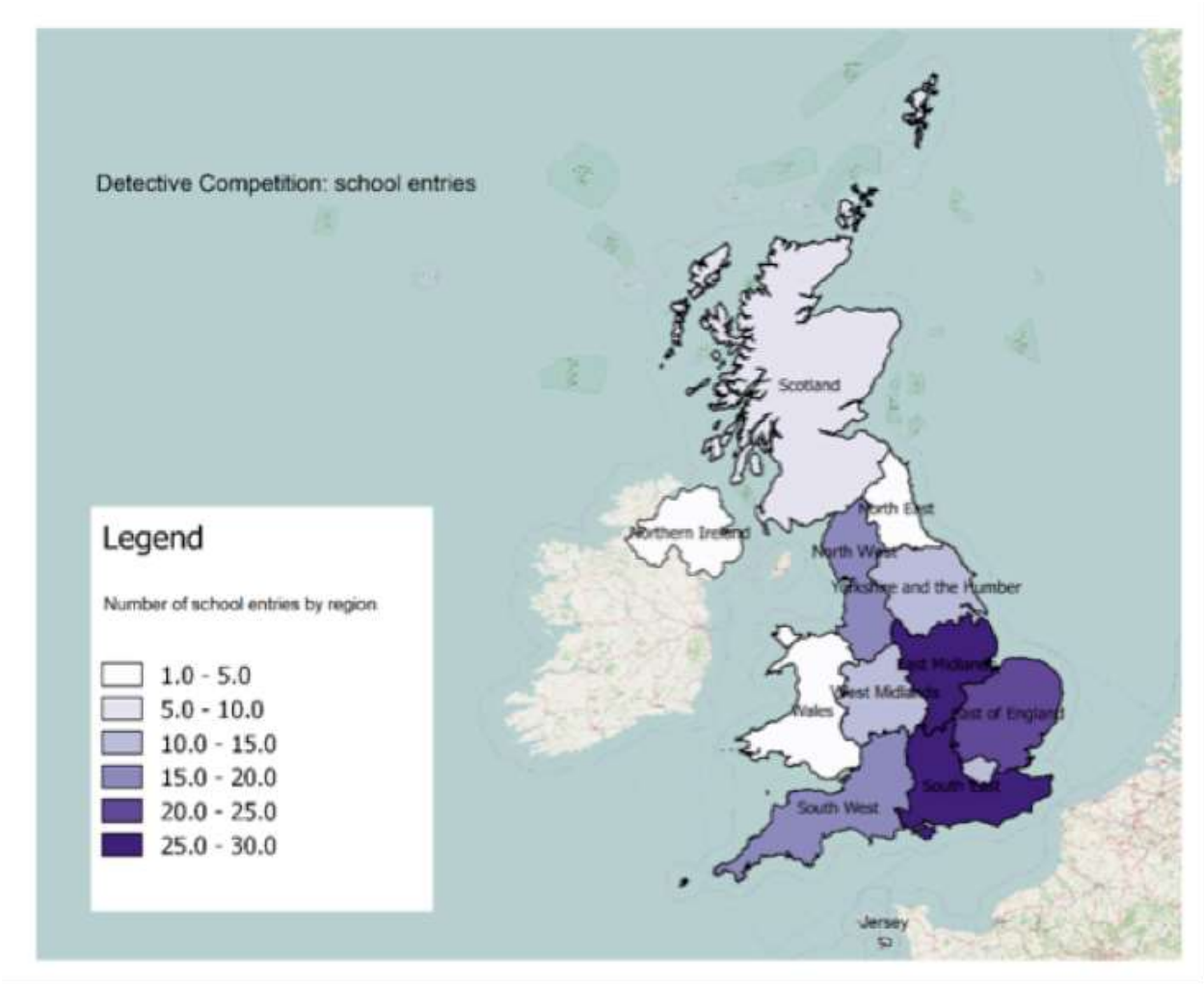
Schools and individuals in the South East and East Midlands were more likely to take part in the Earth Observation Detective than anywhere else in the country, while schools and individuals in the devolved administrations were underrepresented (Table 19).

**Table 19: Geographical distribution of Earth Observation Detective schools**

| Geographical regions | Number of schools | % | National % |
|---|---|---|---|
| East Midlands | 30 | 17.6 | 8.5 |
| West Midlands | 14 | 8.3 | 10.1 |
| North East | 5 | 2.9 | 4.5 |
| North West | 17 | 10 | 13.3 |
| East of England | 21 | 12.4 | 10.7 |
| London | 12 | 7.1 | 12.1 |
| South East | 29 | 17.1 | 15.9 |
| South West | 16 | 9.4 | 8.9 |
| Yorkshire and the Humber | 15 | 8.8 | 9.2 |
| Jersey | 2 | 1.2 | |
| N Ireland | 2 | 1.2 | |
| Scotland | 6 | 3.6 | |
| Wales | 1 | 0.6 | |
| Others | | | 6.8 |
| **Total** | 170 | | |

The map shows that the majority of schools involved in the Detective Competition came from the South East and the East Midlands. Schools in the North East appears to be underrepresented.

**Figure 14: Geographical distribution of Earth Observation Detective schools**



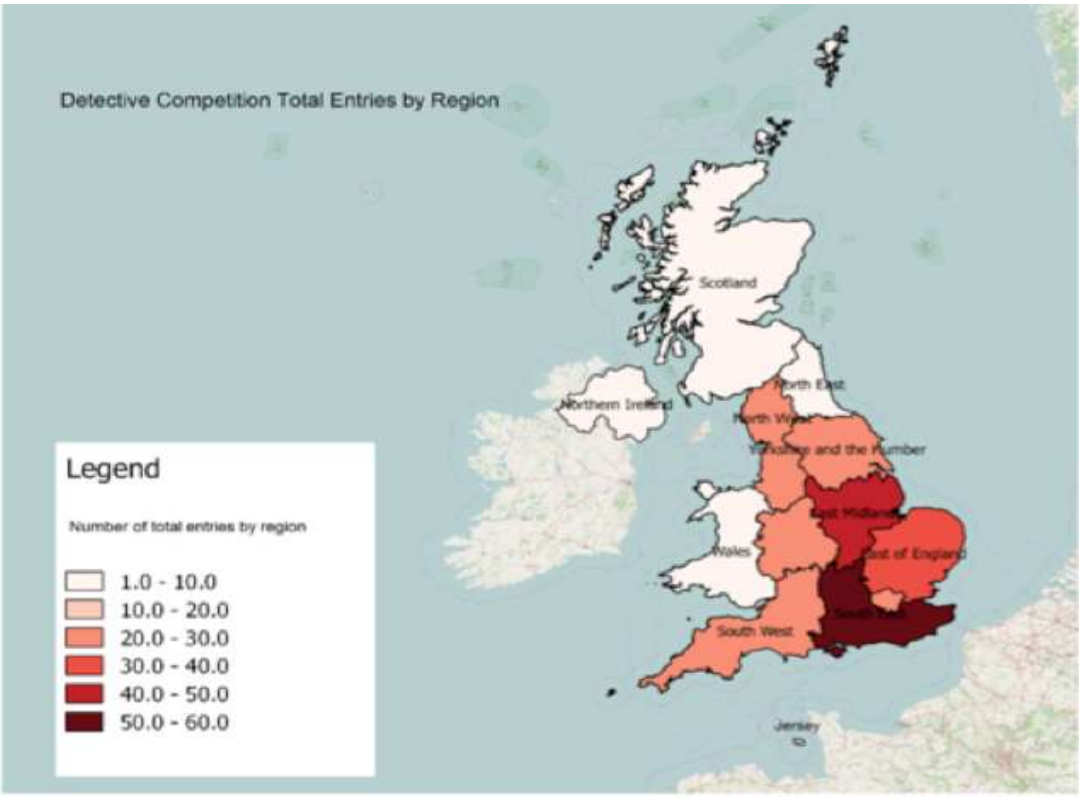

Most of the entries from individuals not from schools came from the South East (Table 20).

**Table 20: Geographical distribution of individual entries not from schools**

| **Geographical regions** | **Frequency** | **%** |
|---|---|---|
| East Midlands | 17 | 13% |
| West Midlands | 10 | 8% |
| North East | 3 | 2% |
| North West | 7 | 5% |
| East of England | 18 | 14% |
| London | 12 | 14% |
| South East | 31 | 24% |
| South West | 13 | 10% |
| Yorkshire and the Humber | 10 | 8% |
| Jersey | 1 | 1% |
| N Ireland | 3 | 2% |
| Scotland | 4 | 3% |
| Wales | 0 | 0% |
| **Total** | 129 | 100% |

Figure 15 shows visually where most of the registrations came from (including schools and non schools).

**Figure 15: Distribution of all entries including schools and non-schools**




Excluding individual registrations and family groups, there were proportionately more schools from towns and smaller cities taking part in Earth Observation Detective Competition (Table 21).

**Table 21: Locality of schools that participated in Earth Observation Detective competition**

| **Types of locality** | **Number of schools** | **%** | **National (%)** |
|---|---|---|---|
| Urban conurbation | 9 | 5.3 | 32.6 |
| City and town | 22 | 12.9 | 40.9 |
| Rural town and village | 10 | 5.9 | 20.6 |
| Rural hamlet and isolated | 4 | 2.4 | 5.1 |
| Others | 125 | 73.5 | 0.7 |
| **Total** | 170 | 100 | 100 |

Note: Others include a large number who were registered as individuals rather than via schools so their location is not known. Many of these did not have the full postcode making it difficult to ascertain their locality.

# ASTRO PI, SONIC PI AND MP3 COMPETITIONS

## Astro Pi Competition– 2015

The Astro Pi competition ran by the Raspberry Pi Foundation during 2015. Two augmented Raspberry Pi computers (called Astro Pis) were flown to the International Space Station as part of Tim Peake's mission. The computers were both equipped with Sense HAT which could be used to measure the environment in the space station, detect how it's moving through space, and pick up the Earth's magnetic field. In addition each Astro Pi was equipped with a camera (one with an infrared camera and one with a visible spectrum camera).

The premise of the competition was to ask 'what would you do with this equipment?' School-age children were encouraged to devise computer science experiments for Peake to run whilst on board the ISS. These experiments were in the form of Python programs, written and tested by the students, using their own equipment here on Earth.

Seven winning entries were sent to the ISS in December 2015. The winners included reaction time games and real science experiments looking at radiation in space.

In the analysis below we consider the schools and groups involved in the Astro Pi competition.

## Who are the participants in the Astro Pi competition?

A total of 275 entries were received as part of the Astro Pi competition in 2015. Table 22 gives details of the primary and secondary age breakdown as well as numbers of entries which were school-based or non-school based (i.e. from other groups such as cub scouts, coding clubs or individual participants). It shows that the Astro Pi competition was equally popular with primary and secondary school aged pupils.

**Table 22: Breakdown of school and non-school entries for Astro Pi competition by school phase**

| | Total number of entries | Number of participants | School-based entries | Non-school-based entries |
|---|---|---|---|---|
| Primary-aged | 112 | Data unavailable | 67 | 35 |
| Secondary-aged | 163 | 549 | 133 | 30 |

| | | | | |
|---|---|---|---|---|
| **Total** | 275 | | 200 | 65 |

A small number of groups or schools provided more than one entry to the competition. We are assuming that these different entries did not involve the same pupils but without pupil-level data we cannot be certain of this. However, where we were certain that the same schools or individuals were involved (e.g. submitting more than one entry), the duplicates were removed. After removing these duplicates, the total number of participants was 206 (Table 23).

**Table 23: Number of participants after duplicates are removed**

| | **Number of school-based entries** | **Number of non-school-based entries** |
|---|---|---|
| Primary-aged | 64 | 35 |
| Secondary-aged | 79 | 28 |
| **Total** | 143 | 63 |

The vast majority of entries to the competition were from the UK. A small number (n=12), however, were submitted from children living abroad. Six of these were from primary aged children and six from secondary-age. These international entries came from: Argentina, Australia, France, Italy, Malaysia, Poland, Romania, Sweden, Taiwan and the USA. For the secondary age group we know that a total of 549 students participated in the competition, 157 girls and 392 boys.

**Table 24: Types of educational establishment where Astro Pi entries came from**

| **Type of Establishment** | **Number** | **%** | **National (%)** |
|---|---|---|---|
| Academy/Free School | 50 | 39.3 | 40.9 |
| Community School | 36 | 28.3 | 34.0 |
| Independent School | 24 | 18.9 | 6.8 |
| Voluntary School | 15 | 11.8 | 16.3 |
| Other | 2 | 1.6 | 2.0 |
| **Total** | 127 | 100.0 | 100.0 |

Nearly a fifth of the school-based entries in England came from independent schools which account for just 6.8% of schools nationally (Table 24). However, we cannot be sure of the school background of the children who entered the competition via other groups (e.g. scouts, coding clubs) or as individuals.

Schools with Astro Pi entrants tended to be more socioeconomically advantaged and have fewer EAL children than the national average (Table 25). This is likely because of the high proportion of independent schools as pupils attending these schools are less likely to be FSM-eligible. Information on pupil characteristics for independent-school children is not available as part of the Annual Schools Census, however, so the averages below should be read with caution.

**Table 25: Levels of disadvantage of Astro Pi schools**

| Indicators of disadvantage | Astro Pi Schools average (%) | National (%) |
|---|---|---|
| % FSM Eligibility | 8.2 | 13.3 |
| % EAL | 8.3 | 13.0 |

The following analysis focuses predominantly on the reach of the entries and the types of institutions involved. Where entries are linked to schools in England we use data from the Annual Schools Census to describe the schools participating.

## Where do Astro Pi participants come from?

A considerable proportion of entries for the Astro Pi competition were from the South East and the East of England (Table 26). The column on the right indicates that these areas were over-represented in the Astro Pi competition when compared to the number of schools in those areas. This is not an ideal comparison due to the high proportion of non-school based competition entries. Nevertheless, it does provide an indication of the spread across the country. By contrast a number of areas appear to be somewhat under-represented in the competition. This is particularly the case with the North West, the West Midlands and Wales.

**Table 26: Geographical distribution of Astro Pi entries**

| Geographical regions | Number of entries | % | Percentage of schools |
|---|---|---|---|
| East Midlands | 9 | 4.4 | 8.5 |
| East of England | 41 | 19.9 | 10.7 |
| London | 18 | 8.7 | 12.1 |
| North East | 5 | 2.4 | 4.5 |
| North West | 11 | 5.3 | 13.3 |
| South East | 46 | 22.3 | 15.9 |
| South West | 13 | 6.3 | 8.9 |
| West Midlands | 9 | 4.4 | 10.1 |
| Yorkshire and Humber | 23 | 11.2 | 9.2 |
| Scotland | 11 | 5.3 | N/A |
| Wales | 3 | 1.5 | 6.2 |
| Northern Ireland | 2 | 1.0 | N/A |
| Channel Islands | 0 | 0.0 | N/A |
| International | 12 | 5.8 | N/A |
| Unknown | 3 | 1.5 | N/A |
| **Total** | 206 | 100.0 | |

The map below (Figure 16) shows visually a heavy concentration of entries in the South East of England.

**Figure 16: Geographical distribution of Astro Pi competition entries**

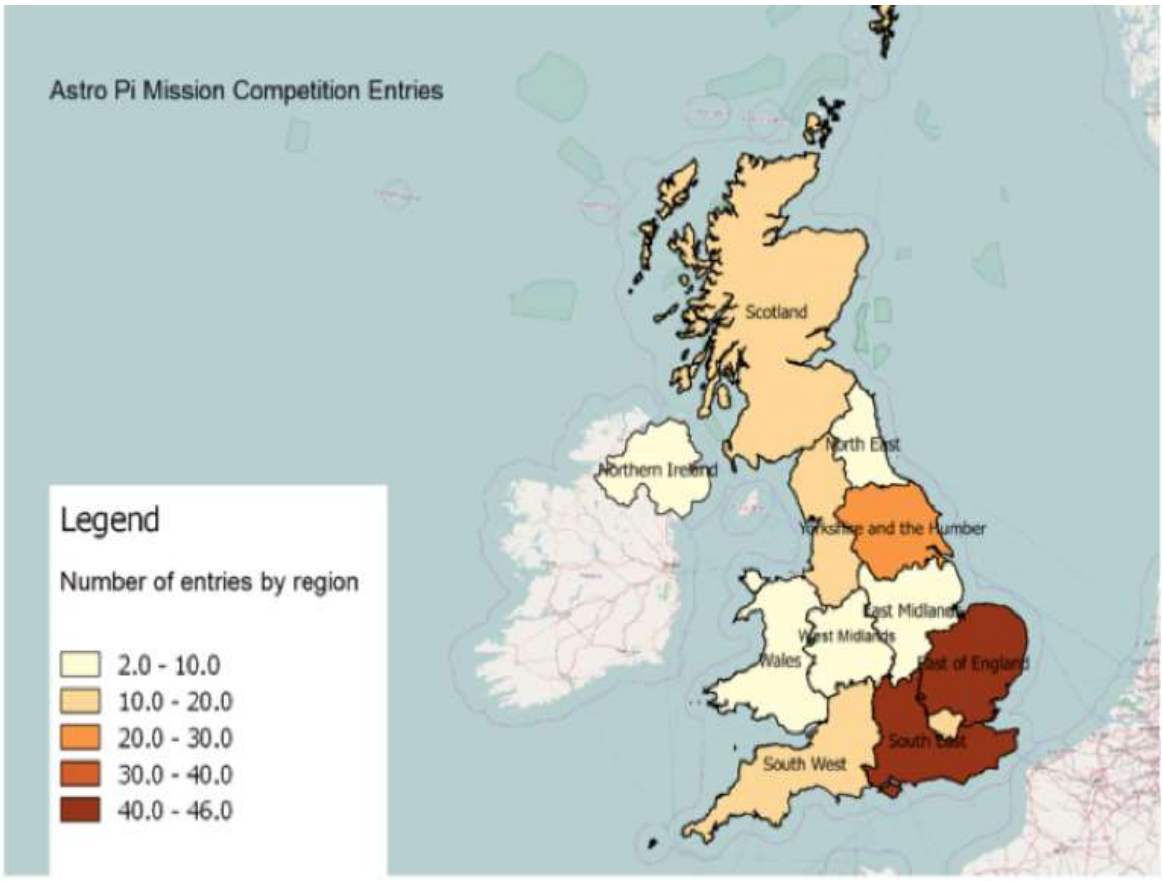



Table 27 shows that three quarters of the schools participating in Astro Pi were based in urban areas in line with the three quarters of schools nationally. The remaining quarter of competition schools were based in more rural areas (including rural towns, villages and hamlets). This analysis is limited by the fact those entrants who appeared not to be linked to a school or who did not provide school details are excluded.

**Table 27: Locality of entries in Astro Pi competition**

| Types of locality | Number | % | National (%) |
|---|---|---|---|
| Urban conurbation | 31 | 24.4 | 34.8 |
| Urban city and town | 64 | 50.4 | 39.7 |
| Rural village | 25 | 19.7 | 19.6 |
| Rural hamlet and isolated dwellings | 4 | 3.1 | 4.5 |
| Other | 3 | 2.4 | 1.3 |
| **Total** | 127 | 100.0 | 100.0 |

## MP3 and Sonic Pi Competitions – 2016

In early 2016 two further challenges were presented. The first asked young people to write code in order to turn the two Astro Pi computers into an MP3 player so that Tim Peake could listen to the music on the ISS. The second required children to code Sonic Pi music for Peake to listen to via the MP3 player. The tables below give details on the numbers of competition participants and the areas they have come from. Some detail on school background is provided too.

A total of 39 entries were received from 67 participants (Table 28). The majority of participants in the MP3 competition worked as individuals. Just two entries were the result of a pair working together. The Sonic Pi competition had a total of 27 entries from 20 different schools, organisations or individuals.

One primary school provided four different entries to the competition (with a total of 13 pupils involved) and another primary school provided five entries (involving 11 students). Students were allowed to enter both competitions. There is only one instance though where the same school has entered both the Sonic Pi and MP3 competition. We cannot be sure if it was the same two children who entered.

**Table 28: Number of entries to MP3 and Sonic Pi competitions**

| | Number of entries | Number of participants |
|---|---|---|
| MP3 Competition | 12 | 14 |
| Sonic Pi Competition | 27 | 53 |
| **Total** | 39 | 67 |

## Who are the participants in the MP3 and Sonic Pi competitions?

The two competitions were equally popular with both primary and secondary school aged children, with slightly more entries received from the secondary schools (Table 29).

**Table 29: Sonic Pi and MP3 competition entries by phase of schooling**

| | Primary-aged entries | Secondary-aged entries | Post-16 | Total |
|---|---|---|---|---|
| MP3 Competition | 2 | 9 | 1 | 12 |
| Sonic Pi Competition | 15 | 11 | 1 | 27 |
| **Total** | 17 | 20 | 2 | 39 |

Majority of the entries came from schools or school-based groups. After removing duplicate entries from the same schools, it can be seen that the majority of competition entries did come from schools and school-based groups (e.g. school coding clubs). The remaining entries were submitted by students who are home-schooled, attending coding clubs outside of school or have participated as an individual (Table 30).

**Table 30: Number of school-based and non-school based entries**

| | School-based entries | Non-school based |
|---|---|---|
| MP3 Competition | 9 | 3 |
| Sonic Pi Competition | 17 | 3 |

## Where do Sonic Pi and MP3 competition entries come from?

Table 31 shows the regions where entries to the two competitions were from after removing duplicate schools/organisations. All entries in the Sonic Pi and MP3 competitions were UK based.

**Table 31: Geographical distribution of Sonic Pi and MP3 participants**

| **Geographical regions** | **MP3 Competition** | **Sonic Pi Competition** |
|---|---|---|
| East Midlands | 0 | 1 |
| East of England | 0 | 2 |
| London | 1 | 2 |
| North West | 1 | 2 |
| North East | 0 | 1 |
| South East | 6 | 7 |
| South West | 2 | 1 |
| West Midlands | 0 | 1 |
| Yorkshire and Humber | 0 | 2 |
| Scotland | 0 | 1 |
| Wales | 1 | 0 |
| Northern Ireland | 1 | 0 |
| **Total** | 12 | 20 |

Most of the schools/groups participating in both competitions were in the South East of England (Figures 17 and 18).

**Figure 17: Geographical distribution of MP3 competition entries**

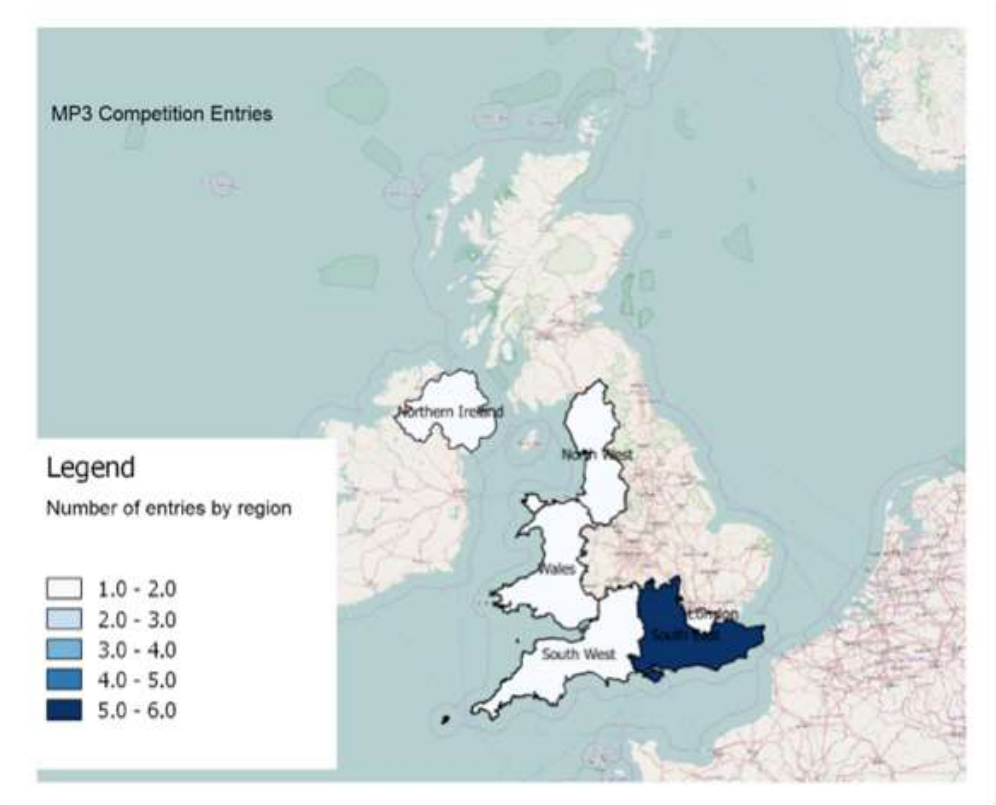
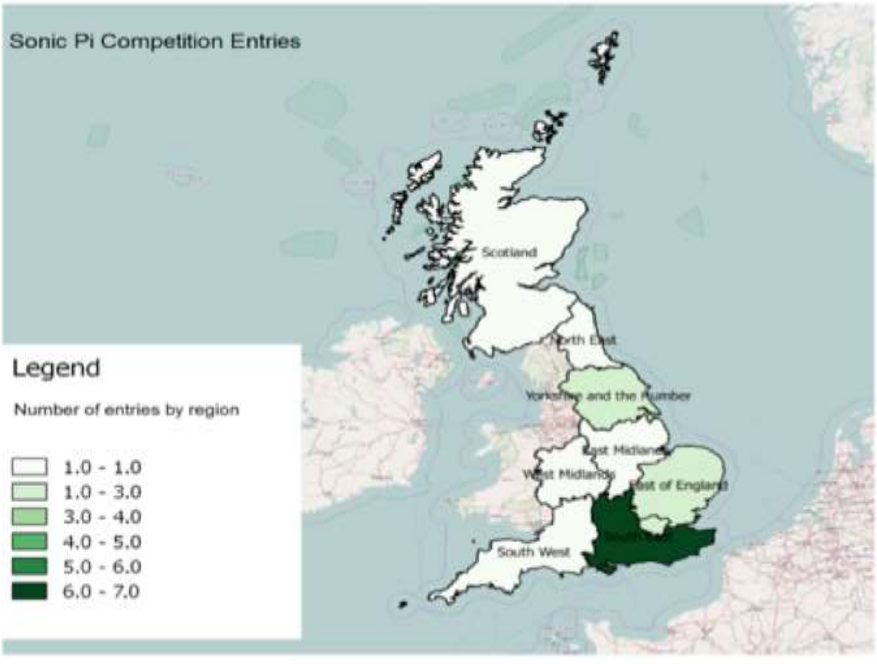



**Figure 18: Geographical distribution of Sonic Pi competition entries**



# DESTINATION SPACE

In celebration of Tim Peake's mission to the International Space Station, the Association of Science and Discovery Centres ran Destination Space in 20 centres across UK. Destination Space is a programme consisting of a series of family shows, workshops and other events linked to the Principia mission. Participants included pupils from schools, family groups (e.g. families with children, birthday parties), general public and youth clubs like the uniformed groups (e.g. Brownies, Girl Guides, Scouts, Sea Cadets), children's clubs and outreach groups.

A total of 731,935 participants were involved in the activities under the Destination Space project. These included participants from 1,322 schools across the country including Scotland and Wales.

## Who are the participants in Destination Space?

Destination Space participants were predominantly primary school children (91%) with a small number of secondary school pupils (9%). Destination Space appears to be largely taken up by primary school age children (Table 32).

**Table 32: Destination Space participants by phase of schooling**

| **School Phase** | **Schools** | | **Participants** | |
|---|---|---|---|---|
| Primary | 1218 | 92% | 66163 | 91% |
| Secondary | 104 | 8% | 6327 | 9% |
| **Total** | 1322 | 100% | 72490 | 100% |

Note: Some schools share the same postcodes but have different names. These are counted as different schools if we could locate the school by their names. In some cases we could not confirm from the list of schools in the Edubase and internet searches if these were different schools, so a judgment was made based on the location and proximity of the school to decide if they were the same school.

Destination Space participants were most likely to be from Voluntary and Community schools (Table 33). The types of schools participating in Destination Space can be considered as broadly representative of the national school population. However, care has to be taken in interpreting the types of schools as a number of Community schools have now been classified as Academies. Special schools were underrepresented.

**Table 33: Destination Space participants by types of establishment**

| Types of educational establishment | Number from each type of school | | National (%) | Number of participants | |
|---|---|---|---|---|---|
| Academy | 141 | 10.7% | 24.6 | 9,029 | 12.5% |
| Community school | 389 | 29.4% | 30.8 | 22,299 | 30.8% |
| Voluntary School | 300 | 22.7% | 20.5 | 13,701 | 18.9 |
| Independent school | 96 | 7.3% | 6.9 | 3,707 | 5.1% |
| Special school | 25 | 1.9% | 7.0 | 826 | 1.1 |
| Scotland | 210 | 15.9% | | 8,855 | 12.2% |
| Wales | 115 | 8.7% | | 10,222 | 14.1 |
| N Ireland | 31 | 2.3% | | 1,687 | 2.3 |
| Others | 15 | 1.1% | 7.0 | 2,164 | 3.0 |
| **Total** | 1322 | 100.0% | 100.1 | 72,490 | 100 |

Note: Special school includes mental health facility and hospital school for sick children
'Others' includes 4 home educators, 4 Nurseries/child care centres, 1 charity group and 3 schools outside the UK.

Schools taking part in Destination Space are proportionately more disadvantaged compared to the national average (Table 34).

**Table: 34: Levels of disadvantage of Destination Space schools**

| Indicators of disadvantage | Destination Space | National average |
|---|---|---|
| %FSM | 19.5 | 13.3 |
| %EAL | 13.2 | 13.0 |
| %SEN | 7.2 | 2.6 |
| School size | 338 | 350 |

## Where do Destination Space participants come from?

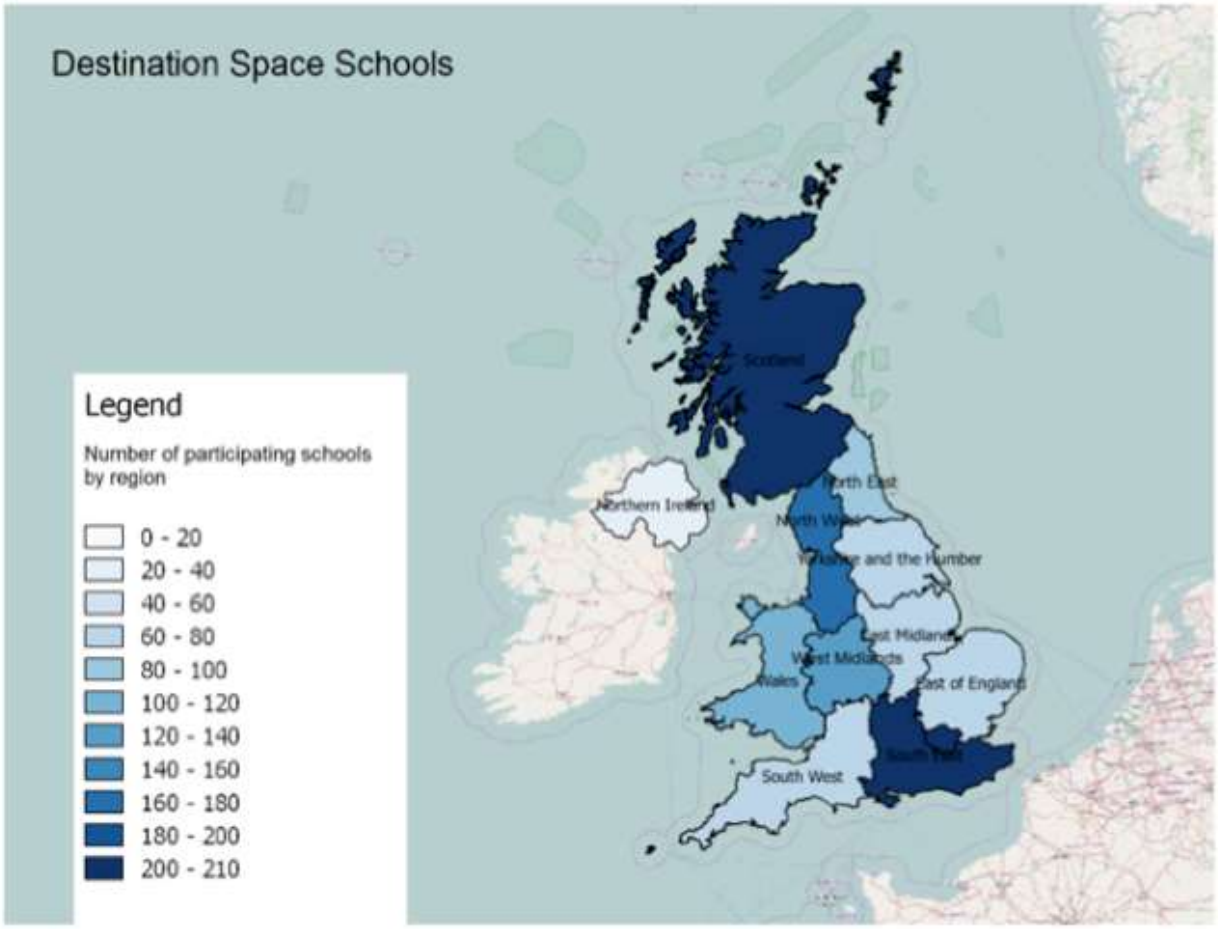
A large proportion of schools taking part in Destination Space events came from Scotland and the South East (Table 35).

**Table 35: Geographical distribution of Destination Space schools**

| Geographical regions | Frequency | % | National (%) |
|---|---|---|---|
| East Midlands | 77 | 5.8 | 8.5 |
| West Midlands | 139 | 10.5 | 10.1 |
| North East | 85 | 6.4 | 4.5 |
| North West | 170 | 12.9 | 13.3 |
| East of England | 70 | 5.3 | 10.7 |
| London | 72 | 5.4 | 12.1 |
| South East | 205 | 15.5 | 15.9 |
| South West | 62 | 4.7 | 8.9 |
| Yorkshire and the Humber | 78 | 5.9 | 9.2 |
| N Ireland | 31 | 2.3 | |
| Scotland | 210 | 15.9 | 0.6 |
| Wales | 116 | 8.8 | 6.2 |
| Unknown | 6 | 0.5 | |
| **Total** | 1322 | 100 | |

The map (Figure 19) shows a heavy concentration of entries from Scotland. Over a quarter of the schools (27%) taking part in Destination Space came from outside England, suggesting a wide outreach of the project (Table 33).

**Figure 19: Geographical distribution of schools participating in Destination Space**




Looking at schools in England only (excluding Scotland, Wales and N Ireland), the South East, North West, North East and the West Midlands were overrepresented, while London, East of England, the South West and Yorkshire and the Humber were underrepresented (see Table 36). This is largely due to the location of the venues where these events were held. Out of the 20 centres four were in Scotland, two each in the North East, North West, the South East and the South West.

**Table 36: Geographical distribution of Destination Space schools in England only**

| Geographical regions | Frequency | % | National % |
|---|---|---|---|
| East Midlands | 77 | 8 | 8.5 |
| West Midlands | 139 | 14.5 | 10.1 |
| North East | 85 | 8.8 | 4.5 |
| North West | 170 | 17.7 | 13.3 |
| East of England | 70 | 7.3 | 10.7 |
| London | 72 | 7.5 | 12.1 |
| South East | 205 | 21.4 | 15.9 |
| South West | 62 | 6.5 | 8.9 |
| Yorkshire and the Humber | 78 | 8.1 | 9.2 |
| **Total** | 958 | | |

Looking at England only, the large majority of schools were from cities and towns (32.1%) and 27% from large urban conurbations. In general this is representative of the distribution of schools in England (Table 37).

**Table 37: Locality of Destination Space schools**

| Types of locality | Frequency | % | National (%) |
|---|---|---|---|
| Urban conurbation | 353 | 26.7 | 32.6 |
| City and town | 427 | 32.1 | 40.9 |
| Rural town and village | 204 | 15.4 | 20.6 |
| Rural hamlet and isolated | 46 | 3.5 | 5.1 |
| Others | 292 | 22.1 | 0.7 |
| **Total** | 1322 | 100 | 100 |

## Public and other groups

Besides schools, the event also attracted families, the general public, school clubs (e.g. Scouts, Brownies, Explorers, Rainbows and Beavers) and organisations. The number of participants for each of these events is summarised below.

Overall, the project reached a total of 731,935 people from across the whole of UK. Of these 10% of the participants (72,490) were registered by their schools. The remaining 659,445 registrations were from clubs, families with children and other individual groups. These are summarised in the table below (Table 38).

**Table: 38: Registrations received for Destination Space project**

| Centre | Schools | Clubs | Family Show | Special Launch | Meet the Expert | Schools Meet the Expert | Total |
|---|---|---|---|---|---|---|---|
| Aberdeen Science Centre | 4452 | 645 | 11187 | 3166 | 110 | | 19,529 |
| At-Bristol | 2329 | 825 | 5313 | 10506 | 350 | | 19,323 |
| Centre for Life | 3037 | 197 | 19675 | 14336 | 0 | | 37,245 |
| Cambridge Science Centre | 3873 | 170 | 9420 | 2732 | 760 | | 17,055 |
| Dundee Science Centre | 2253 | 193 | 31390 | 4118 | 2893 | | 40,817 |
| Dynamic Earth | 1237 | 788 | 20010 | 18102 | 3420 | | 43,616 |
| Eden | 345 | 0 | 6145 | 6887 | 0 | | 13,377 |
| Eureka | 3253 | 570 | 9077 | 8776 | 1920 | | 23,596 |
| Glasgow | 924 | 2080 | 18623 | 65,578 | 623 | | 87,828 |
| Jodrell Bank | 4477 | 766 | 8094 | 3365 | 1244 | | 17,977 |
| National Space Centre | 10360 | 2255 | 30135 | 71802 | 1980 | | 116,532 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Royal Observatory Greenwich | 1252 | 0 | 13566 | 0 | 25303 | 31,941 | 72,062 |
| Science Museum | 3994 | 320 | 12970 | 7576 | 0 | | 24,860 |
| Techniquest, Cardiff | 8887 | 491 | 6509 | 416 | 0 | | 16,303 |
| Techniquest Glyndwr | 1823 | 1059 | 5978 | 4269 | 250 | | 13,379 |
| The Observatory Science Centre | 9938 | 2527 | 14984 | 5069 | 1843 | | 34,361 |
| Thinktank | 3730 | 731 | 6405 | 62632 | 2000 | | 75,569 |
| W5 | 1687 | 0 | 6873 | 5269 | 0 | | 13,829 |
| Winchester Science Centre | 2694 | 54 | 11619 | 2193 | 0 | | 16,489 |
| World Museum | 1845 | 21 | 22858 | 2360 | 1104 | | 28,188 |
| **Total** | 72490 | 13692 | 266813 | 299,152 | 43800 | 31941 | 731,935 |

# SPACE TO EARTH CHALLENGE

The Space to Earth Challenge is a programme that was designed with Venture Thinking to use Tim Peake's training programme to inspire interest in fitness, science, maths and technology. The initiative challenges students to run, swim, cycle, climb, dance or exercise the 400 km distance from the Earth to the International Space Station orbit. Educators were encouraged to create their own 'spaceathlons' – a trio of space, sport and science activities – for children to participate in. A range of resources to support this were included on the programme's website. Children were able to collect badges for individual achievements and certificates were available to download from the designated web page.

## Who are the participants in the Space to Earth Challenge?

On the Principia website the age-ranges suggested for this programme are 7-11 and 11-14. The data below, however, indicates that the challenge reached a wider age range including Key Stage 4 and 5

students. In addition to schools participating, a number of other organisations were also involved in supporting children with the Space to Earth challenge.

The data relating to participants in the Space to Earth challenge are presented below (Table 39). Unfortunately there were a number of instances of missing data, particularly in relation to school names and number of participants. Nevertheless, the information that we do have is enough to give some indication of the groups and individuals involved in this initiative.

**Table 39: Types of organisations involved in providing Space to Earth programme**

| **Type of organisations** | **Number** | **Percentage** |
|---|---|---|
| Named schools/colleges involved | 129 | 72.9 |
| Other schools (not named)* | 9 | 5.1 |
| Groups of general public/individuals | 3 | 1.7 |
| Universities | 4 | 2.3 |
| Non-school-based organisations e.g. sports centres | 8 | 4.5 |
| Unknown | 24 | 13.6 |
| **Total** | 177 | 100.0 |

*There are a number of instances where specific names/numbers of schools/colleges are not given e.g. "schools across London"

Clearly the biggest group involved in supporting the Space to Earth programme was schools. It is possible that there were even more schools involved but because some groups were missing information about type of organisation they have had to be entered as ‘unknown’. It is not surprising that schools are the most represented group here as the resources and information was particularly designed with schools in mind. The challenge also encouraged students to work in groups to achieve the 400 km distance which means that it may have been less appealing to individuals.

A small number of universities were involved in supporting the programme. While they mainly worked with school children, we do not have the data on the schools that these pupils were from.

Table 40 gives an overview of the number of participants involved. Two thirds of students were from named schools within the data set with a further 1,235 participants from schools without details. Nearly a fifth of students are from the 'unknown' organisations although it is likely that the majority of these are school-based. A minority of participants were from other groups and organisations e.g. home-school groups, sports centres and individuals. Students working through the four universities represented less than 1% of the overall student numbers.

**Table 40: Number of pupils involved in Space to Earth from different organisations**

| **Types of organisations*** | **Number** | **Percentage** |
|---|---|---|
| Named schools/colleges involved | 15010 | 66.1 |
| Other schools (not named) | 1235 | 5.4 |
| Groups of general public/individuals | 867 | 3.8 |
| Universities | 140 | 0.6 |
| Non-school-based organisations e.g. sports centres | 1373 | 6.0 |
| Unknown | 4070 | 17.9 |
| **Total** | 22,695 | 100.0 |

*A number of organisations did not have pupil numbers attached so there are likely to be a number of students missing from this count.

Table 41 indicates the age groups represented in relation to the named schools that have participated. For schools who were not named and for organisations for which we have no details, it is impossible to know exactly what age groups were involved.

Space to Earth Challenge attracted both primary and secondary school children. Just over 40% of schools involved were primary schools and 30% were secondaries. A small percentage of all-through schools and post-16 colleges also participated. For 19 of the schools there was no information about what age group they served and it was not possible to deduce this as the schools' names and other details were not provided.

**Table 41: Space to Earth participants by phase of schooling**

| School Phase | Number | Percentage | National (%) |
|---|---|---|---|
| Primary | 57 | 43.8 | 68.9 |
| Secondary | 39 | 30.0 | 12.9 |
| All-through | 8 | 6.2 | 0.5 |
| Post-16 | 7 | 5.4 | 1.6 |
| Unknown | 19 | 14.6 | 16.1 |
| **Total** | 130 | 100.0 | 100.0 |

Over a quarter of the schools that took part in the Space to Earth Challenge were Academies and other autonomous schools. These are underrepresented compared to the national average. It appears that Space to Earth was more successful in attracting participants from Independent schools.

**Table 42: Space to Earth Challenge participants by types of schools**

| School Type | Number | Percentage | National (%) |
|---|---|---|---|
| Academy/Free School | 353 | 27.2 | 40.9 |
| Community | 25 | 19.4 | 34 |
| Further Education Colleges | 3 | 2.3 | 0.2 |
| Independent School | 9 | 7.0 | 6.8 |
| Special School | 1 | 0.8 | 1.3 |
| Voluntary | 7 | 5.5 | 16.3 |
| Unknown/Other | 49 | 38.0 | 0.7 |
| **Total** | 129 | 100.0 | |

**Table 43: Levels of disadvantage of schools participating in Space to Earth Challenge**

| Indicators of disadvantage | Space to Earth schools | National average |
|---|---|---|
| % Free School Meals eligible | 16.1 | 13.3 |
| % EAL | 17.1 | 13.0 |
| % SEN statement or EHCP | 1.8 | 2.8 |

Note: Limited data for independent schools.

## Where do Space to Earth Challenge participants come from?

The highest concentration of schools was in the East of England (Figure 20). Interestingly, Space to Earth appears to attract schools in the North, West Midlands and Scotland, and is less popular with schools in the South. Schools in the South West, East Midlands, Yorkshire and the Humber were seriously underrepresented (Table 44).

**Figure 20: Geographical distribution of Space to Earth Challenge schools**

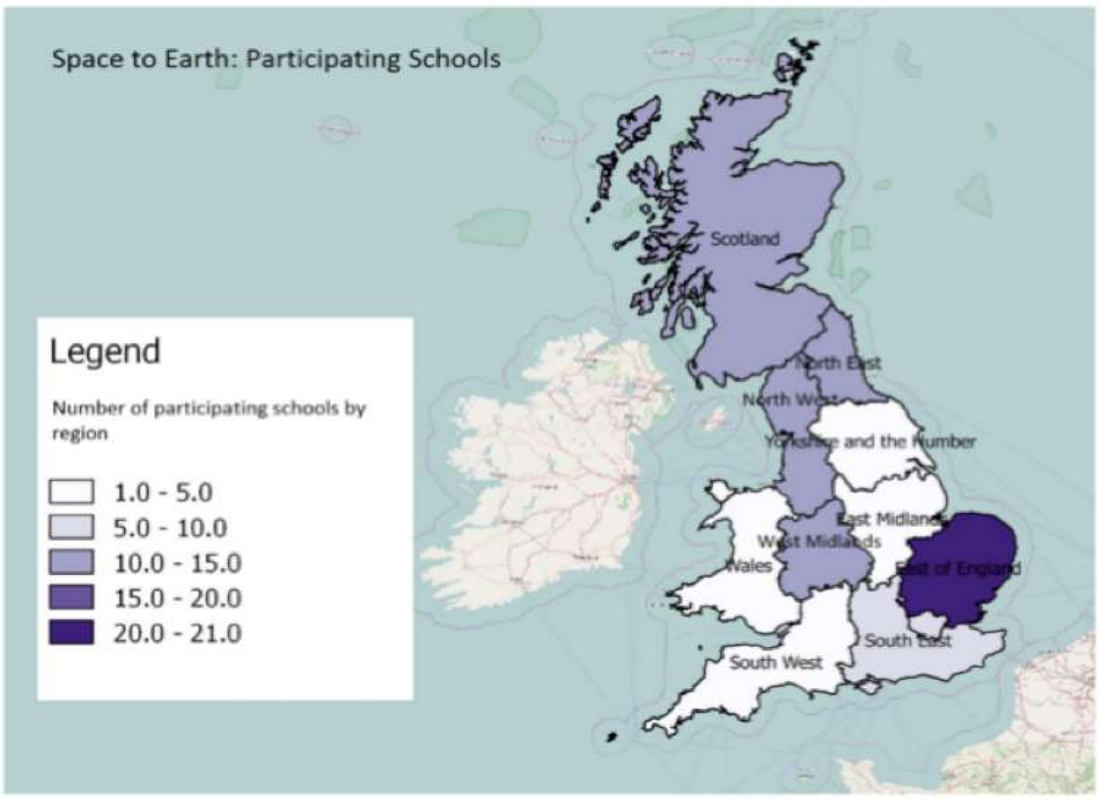


**Table 44: Geographical distribution of Space to Earth Challenge schools**

| Geographical regions | Number | Percentage | National (%) |
|---|---|---|---|
| East Midlands | 3 | 2.3 | 8.5 |
| East of England | 21 | 16.3 | 10.7 |
| London | 10 | 7.8 | 12.1 |
| North East | 13 | 10.1 | 4.5 |
| North West | 12 | 9.3 | 13.3 |
| South East | 8 | 6.2 | 15.9 |
| South West | 3 | 2.3 | 8.9 |
| West Midlands | 13 | 10.1 | 10.1 |
| Yorkshire and the Humber | 1 | 0.8 | 9.2 |
| Scotland | 12 | 9.3 | N/A |
| Wales | 3 | 2.3 | 6.2 |
| Northern Ireland | 0 | 0.0 | N/A |
| Unknown | 30 | 23.3 | N/A |
| **Total** | 129 | 100.0 | |

# INTO FILM SCREENINGS

In celebration of Tim Peake's Principia Mission to the International Space Station a range of events were held. One of these was the Into Film Festival with hundreds of screenings across the country. Two of these were the new Imax films, *A Beautiful Planet* and *Space Station 3D*. These were shot on-board the ISS. The films were screened in public cinemas, mainly the Odeon, Picturehouses (e.g. Cardiff) and the Science Museum. The UK Space Agency also arranged for a number of speakers to attend these screenings to talk about space travel and possible careers in these areas.

Altogether there were 369 registrations for the two films. 70% of these were from the public (Table 45). These included home educators (n= 125) and individuals such as families with children (n=136). Home educators would include those involved in home schooling.

However these public registrations contributed only a very small proportion (10%) of all the people who actually watched the films because most of these were from parents who bought tickets for themselves and one or two children. Participants from schools represented 90% of all the filmgoers.

**Table 45: Types of registrations**

| | **Registrations** | | **Participants** | |
|---|---|---|---|---|
| School | 108 | 30% | 4665 | 90% |
| Public | 261 | 70% | 540 | 10% |
| **Total** | 369 | 100 | 5205 | 100% |

## Who are the participants in Into Film?

Where information is available we know that the majority of the schools that went to the screenings of the two films were primary schools (Table 46).

**Table 46: Participating schools by phase of schooling**

| School Phase | Number of schools | | Participants | | National (%) |
|---|---|---|---|---|---|
| Primary | 73 | 67.6% | 3699 | 79% | 68.9 |
| Secondary | 16 | 13.9% | 395 | 8% | 12.9 |
| Post-16 | 2 | 1.9% | 40 | 1% | 0.4 |
| All Through | 5 | 4.6% | 74 | 2% | 0.5 |
| Unknown | 12 | 12.0% | 457 | 10% | |
| **Total** | 108 | 100 | 4665 | 100% | |

Most of the schools that attended the screenings of Into Film were Community schools (Table 47). These made up 38% of all school registrations, followed by the academies (18%) and voluntary schools (18%). Independent schools made up only 3.7% of the school registrations.

**Table 47: Into Film participants by types of schools**

| Types of schools | Number of schools | | Number of participants | | National (%) |
|---|---|---|---|---|---|
| Academy | 18 | 17% | 717 | 15% | 40.9 |
| Community school | 41 | 38% | 2077 | 45% | 34 |
| Voluntary school | 21 | 19% | 983 | 21% | 16.2 |
| Post-16 | 2 | 2% | 40 | 1% | 0.2 |
| Independent school | 3 | 2% | 98 | 2% | 6.8 |
| Special school | 10 | 9% | 212 | 5% | 1.3 |
| *Schools unknown | 13 | 18% | 538 | 12% | |
| **Total** | 108 | 100% | 4665 | 100% | |

*This includes 10 schools which cannot be found and 3 Welsh schools

Schools visiting the screenings of the films also tended to be more disadvantaged compared to the average schools in England (Table 48).

**Table 48: Levels of disadvantage of Into Film schools**

| Indicators of disadvantage | 'IntoFilmsFilm' school (%) | National average (%) |
|---|---|---|
| %FSM | 20.4 | 13.3 |
| %EAL | 23.7 | 13.0 |
| School size | 396 | 350 |

Note: Data is based on state-funded schools only. Two of the post-secondary schools are higher education institutions. No data is available for such institutions

## Where do participants of Into Film come from?

IntoFilm was particularly popular with schools in London and the North West. Compared to the distribution of schools in England, those in the North West, North East, South East and London were overrepresented (Table 49). No schools from the West Midlands were represented although 10% of schools in England are located there. The South West and the Yorkshire were also underrepresented.

**Table 49: Geographical distribution of schools participating in Into Film**

| Geographical regions | Number of schools | | National (%) | Number of school participants | |
|---|---|---|---|---|---|
| East Midlands | 2 | 2% | 9.1 | 74 | 2% |
| West Midlands | 0 | 0% | 10.8 | 0 | 0% |
| North East | 9 | 10% | 4.8 | 581 | 12% |
| North West | 21 | 22% | 14.3 | 931 | 20% |
| East of England | 12 | 13% | 11.5 | 438 | 9% |
| London | 25 | 27% | 13.0 | 1208 | 26% |
| South East | 18 | 19% | 17.1 | 703 | 15% |
| South West | 2 | 2% | 9.6 | 51 | 1% |
| Yorkshire and the Humber | 5 | 5% | 9.8 | 133 | 3% |
| Scotland | 5 | | | 284 | 6% |
| Wales | 7 | | | 252 | 5% |
| **Total** | 94 | 100% | 100 | 4655 | 100% |

The distribution maps (Figures 21 and 22) show that most of the schools registered for Into Films came from two regions: London and the North West.

**Figure 21: Geographical distribution of Into Film schools**

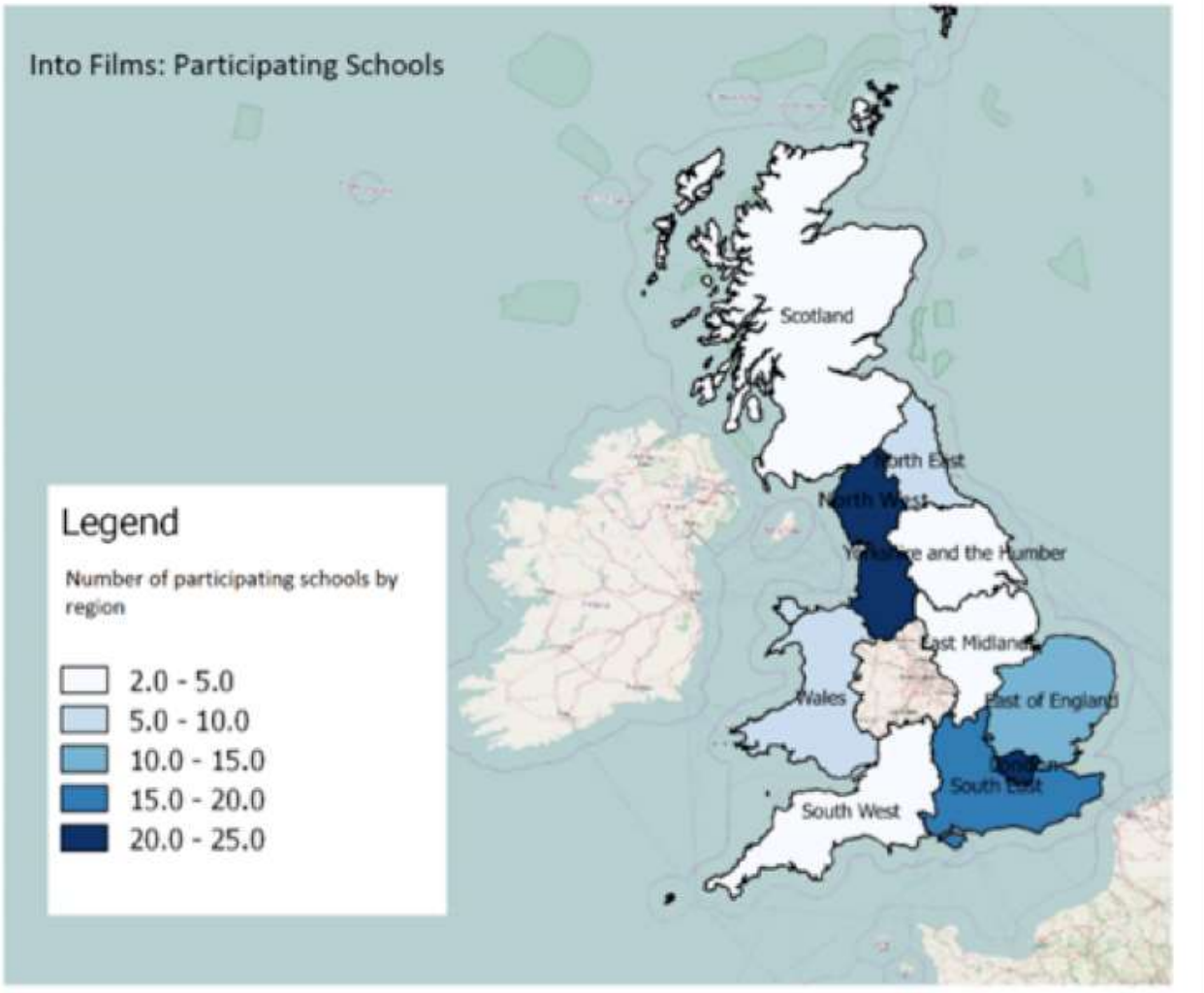
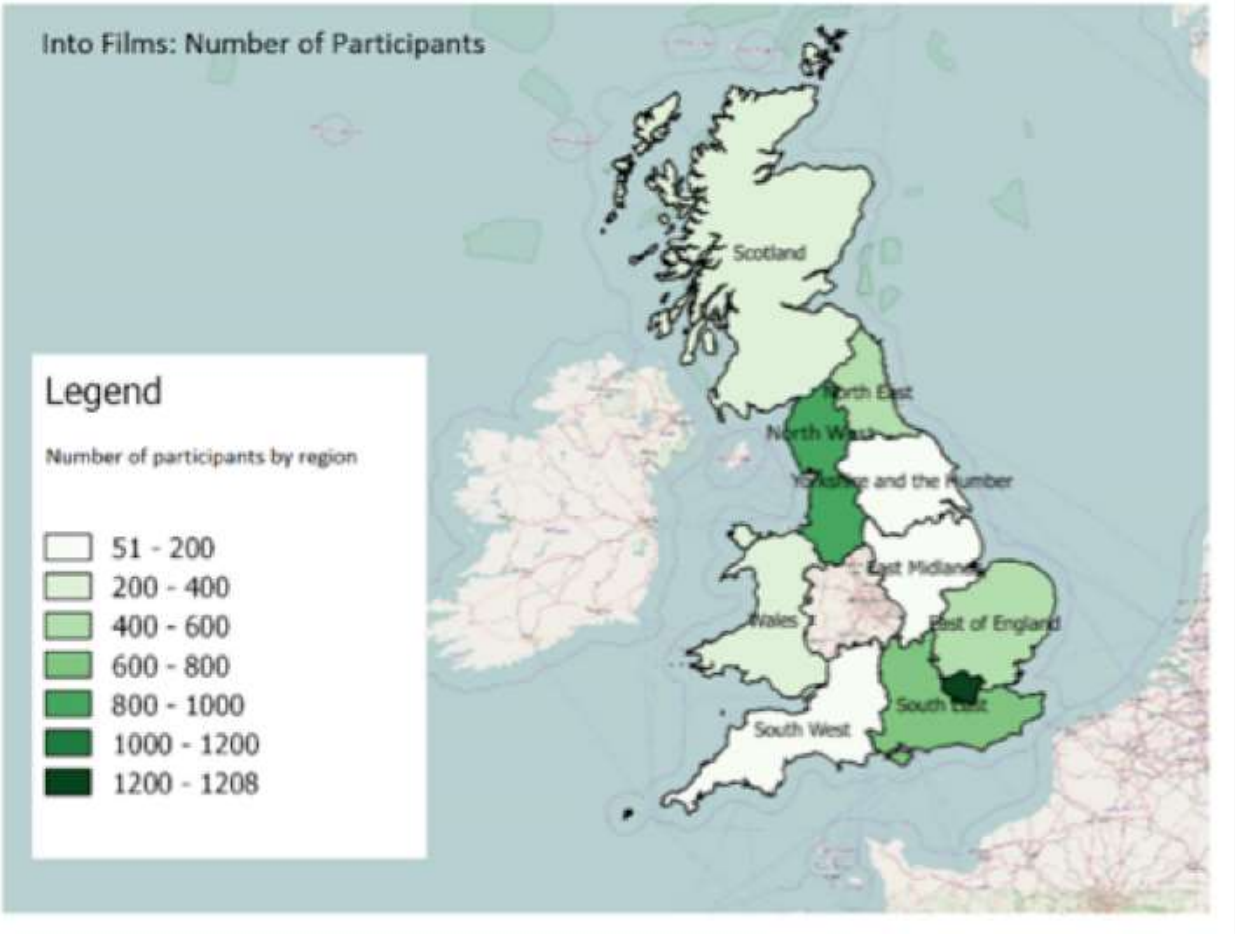


**Figure 22: Geographical distribution of Into Film participants**




**All participants (including public registrations by parents and home educators)**

The distribution of participants is very similar to that of schools. The West Midlands was the most underrepresented. No participants from the West Midlands were represented in this project. This is not surprising as the films were not screened in any of the cinemas or science centres in the West Midlands. Most of the participants came from London, the North West and the South East. London alone accounted for a quarter of the participants (Table 50).

**Table 50: Geographical distribution of all participants (including non-schools)**

| Geographical regions | Number of participants | % |
|---|---|---|
| East Midlands | 78 | 1.5% |
| West Midlands | 0 | 0 |
| North East | 604 | 11.6% |
| North West | 987 | 19.0% |
| East of England | 556 | 10.7% |
| London | 1316 | 25.3% |
| South East | 856 | 16.4% |
| Wales | 114 | 2.2% |
| South West | 71 | 14.1% |
| Yorkshire and the Humber | 174 | 3.3% |
| Wales | 114 | 0.1% |
| Scotland | 3 | 8.6% |
| Unknown | 446 | 100.0% |
| **Total** | 5205 | 1.5% |

The majority of schools for which we have information were from large urban conurbations (see Table 51). Schools in the rural villages were underrepresented. This is to be expected since the films were screened in big cities. However, because we have information about the types of locality for only 74 schools, care has to be taken in interpreting the results.

**Table 51: Types of locality of Into Film schools**

| Types of locality | Number of schools | % | National (%) |
|---|---|---|---|
| Urban conurbation | 50 | 68% | 32.6 |
| City and town | 20 | 27% | 40.9 |
| Rural town and village | 3 | 4% | 20.6 |
| Rural hamlet and isolated | 1 | 1% | 5.1 |
| Others | 0 | 0% | 0.7 |
| **Total** | 74 | 100% | |

# INTO FILM COMPETITION

Along with the screenings of the two films the UK Space Agency also organised a competition inviting young people to create short films, clips, animations or moving images of any kind of up to three minutes, inspired by the Principia mission.

A total of 111 entries were received. The tables below give the breakdown of entrants by age groups, the types of schools represented and the number of participants altogether. The large majority were primary school age children, but there was a small number of post-16 students who took part in the competition too.

There were some schools with two or more groups of participants working on the same project, but with the same number of pupils in each group. For these we assume that they were the same group.

## Who are the participants in the Into Film Competition

The project attracted participants of all age groups from primary to secondary and in to post-secondary. However, proportionately there were more participants from the primary sector taking part in this competition than any other age groups. 69% of the participants were primary school children (Table 52).

**Table 52: Schools taking part in Into Film competition by phase of schooling**

| School phase | Number of schools | | Number of participants | |
|---|---|---|---|---|
| Primary | 62 | 56% | 726 | 69.0% |
| Secondary | 33 | 30% | 262 | 24.9% |
| Post-16 | 16 | 14% | 64 | 6.1% |
| **Total** | 111 | 100% | 1052 | 100% |

In terms of schools (where information is known), most participants came from Community schools. There was also a substantial number of students from Independent schools too (Table 53).

**Table 53: Types of schools taking part in Into Film competition**

| Types of schools | Number of schools | % | Number of participants | % |
|---|---|---|---|---|
| Academy | 12 | 10.8 | 130 | 12.4 |
| Community | 13 | 11.7 | 239 | 22.7 |
| Voluntary | 8 | 7.2 | 108 | 10.3 |
| FE | 3 | 2.7 | 9 | 0.9 |
| Independent | 5 | 4.5 | 108 | 10.3 |
| Special school | 5 | 4.5 | 49 | 4.7 |
| Scotland | 7 | 6.3 | 55 | 5.2 |
| Wales | 6 | 5.4 | 113 | 10.7 |
| Unknown | 52 | 46.8 | 241 | 22.9 |
| **Total** | 111 | 100 | 1052 | 100 |

Note: Unknown refers to those whose identity cannot be determined from the postcodes provided. They could be private clubs and organisations or parents and other individuals. E.g. one address was that for Pizza Express.

Schools taking part in Into Film competition were on average more disadvantaged than the national average (Table 54). They tended to be bigger schools too.

**Table 54: Levels of disadvantage of schools in Into Film competition**

| Indicators of disadvantage | 'Into Film' competition schools | National average (%) |
|---|---|---|
| %FSM | 19.9 | 13.3 |
| %EAL | 26.2 | 13.0 |
| School size | 466 | 350 |

Note: This excludes independent schools as no data is available for such schools.

## Where do Into Film competition participants come from?

As a large number of participants' schools are unknown, counting the number of participants by schools would give an inaccurate picture. For this reason we look at the geographical distribution of the participants rather than the schools.

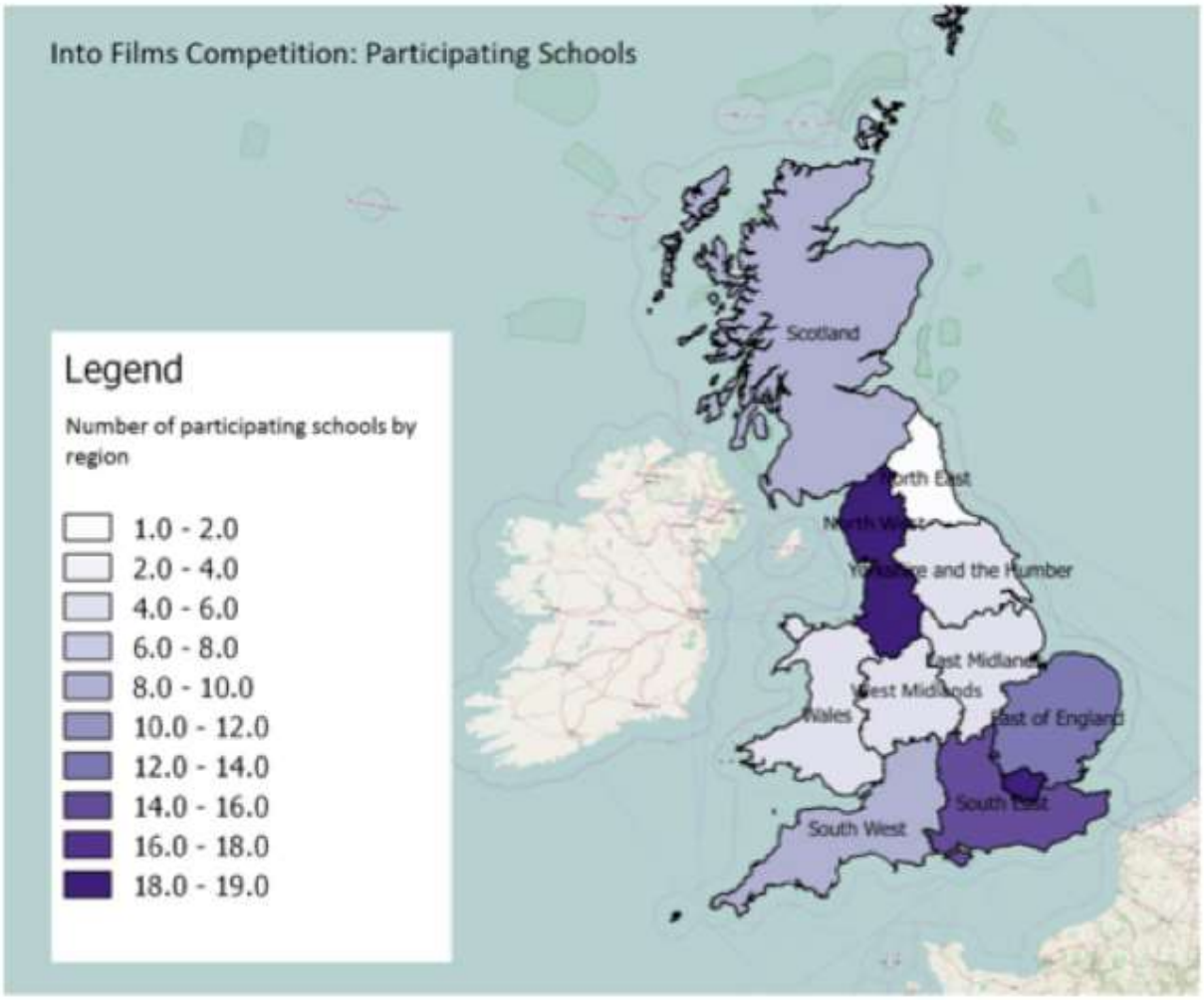
Most of the participants came from London, North West and the East of England (Table 55). The North East was particularly underrepresented with only four entrants. Compared to the national distribution of schools, those from London, the North West and the East of England were overrepresented. All the other regions, particularly the North East, were underrepresented.

**Table 55: Geographical distribution of Into Film competition participants**

| Geographical regions | Number of schools | | National (%) | Number of participants | |
|---|---|---|---|---|---|
| East Midlands | 6 | 5% | 8.5 | 36 | 3.4% |
| West Midlands | 6 | 5% | 10.1 | 31 | 2.9% |
| North East | 1 | 1% | 4.5 | 4 | 0.4% |
| North West | 19 | 17% | 13.3 | 189 | 18.0% |
| East of England | 14 | 13% | 10.7 | 154 | 14.6% |
| London | 19 | 17% | 12.1 | 190 | 18.1% |
| South East | 16 | 14% | 15.9 | 104 | 18.4% |
| South West | 10 | 9% | 8.9 | 125 | 11.9% |
| Yorkshire and the Humber | 5 | 5% | 9.2 | 40 | 3.8% |
| Scotland | 9 | 8% | | 66 | 6.3% |
| Wales | 6 | 5% | 6.2 | 113 | 10.7% |
| **Total** | 111 | 100% | | 1052 | 100% |

This project is interesting as it attracted a large proportion of participants from London and the North West (see Figure 23).

**Figure 23: Geographical distribution of all Into Film competition participants**




In terms of the types of locality, Into Film competition participants were fairly representative of the national student population. Almost all the entrants for the competition came from the urban areas.

**Table 56: Locality of Into Film competition entrants**

| | Number of schools | | National (%) | Number of participants | |
|---|---|---|---|---|---|
| Urban conurbation | 35 | 32% | 32.6% | 339 | 32.2 |
| City and town | 49 | 44% | 40.9% | 501 | 47.6 |
| Rural town and village | 16 | 14% | 20.6% | 130 | 12.4 |
| Rural hamlet and isolated | 4 | 4% | 5.1% | 27 | 2.6 |
| *Scotland | 7 | 6% | | 55 | 5.2 |
| Others | 0 | 0% | 0.7% | | |
| **Total** | 111 | 100% | 99.9% | 1052 | 100 |

*Where possible we tried to determine the urban/rural landscape of the locations, but there were locations in Scotland where this was not possible. We did find the types of locality for some of the Welsh schools, but not the Scottish ones. For the national figure we have no data for 0.1% of the student population. These include pupils in schools in the Channel Island, parts of Wales and 34 new establishments in England where their classifications have yet to be determined.

# INTO FILM FESTIVAL TALKS AND WORKSHOPS

In addition to the two films and competitions, talks and workshops were also conducted in conjunction with the films. These were mainly career talks delivered by STEM ambassadors and the project manager. Some of the events were held in public places, for example, Big Bang @ Wales and the UKSA Outreach Day in Portsmouth and York Universities, but most were hosted in schools across the country. It is therefore not possible to say how many schools actually took part in these events. Where we know the school names, we analysed the characteristics of these schools, but care has to be taken in interpreting the figures because these may not represent the schools that actually took part in the event since some of the schools were hosting venues.

These events were held across 40 venues. Twenty-five of these venues were in schools, most of which were academies and other autonomous schools. 66% of participants came from schools (including two sixth form colleges). Over a quarter attended the events in higher education institutions and universities.

## Who are the participants in the Into Film talks and workshops?

A total of 5,464 young people were recorded as having attended these talks and workshops organized in conjunction with the film festivals. The majority of the participants were secondary and sixth-form students (Key Stage 5). This is to be expected as these were mostly career talks and presentations by STEM ambassadors to get students interested in STEM careers. However, at two venues (Big Bang @ Wales and UKSA outreach at Portsmouth University) some primary school children were also involved, but no primary schools were registered as having participated.

**Table: 57: Into Film talks and workshop participants by phase of schooling**

| **School phase** | **Number of schools** | | **Number of participants** | |
|---|---|---|---|---|
| Primary | 0 | 0% | 0 | 0% |
| Secondary | 31 | 64% | 3509 | 78% |
| Post-16 | 6 | 25% | 1390 | 15% |
| All through | 1 | 0% | 25 | 3% |
| *Public | 2 | 10% | 540 | 5% |
| **Total** | 40 | 100% | 5464 | 100% |

* Includes a careers fair hosted by the Institute of Physics in one university and a public event at the Big Bang Rally.

Just under half of the schools taking part in the talks and workshops were academies (Table 58). It is not clear if these schools were hosting schools or participating schools, but from the number of participants in each school we can assume that these were participating schools. Interestingly no independent schools were represented.

**Table 58: Into Film Talks and Workshops participants by types of school**

| | Types of establishments | | Participants | |
|---|---|---|---|---|
| Academy | 19 | 49% | 2096 | 38% |
| Community school | 3 | 8% | 342 | 6% |
| Voluntary school | 1 | 3% | 254 | 5% |
| Independent school | - | 0% | - | |
| Special school | 2 | 5% | 41 | 1% |
| Sixth form college | 2 | 5% | 121 | 2% |
| HE and FE college | 5 | 13% | 1449 | 27% |
| Public | 2 | 5% | 360 | 7% |
| Welsh school | 1 | 3% | 80 | 1% |
| Scottish school | 5 | 10% | 721 | 13% |
| **Total** | 40 | 100% | 5464 | 100% |

Note: Academies here includes other autonomous schools such as Free schools, Foundation schools, University Technological Colleges and Studio schools

In general, the participating schools tended to be those with higher levels of disadvantage compared to the national average for secondary schools in England.

**Table 59: Levels of disadvantage of participating schools**

| Indicators of disadvantage | Schools | National average (for secondary schools) |
|---|---|---|
| %FSM | 20.5 | 13.2 |
| %EAL | 15.0 | 15.7 |
| % SEN | 14.4 | 3.0 |
| School size | 763 | 939 |

## Where do participants come from?

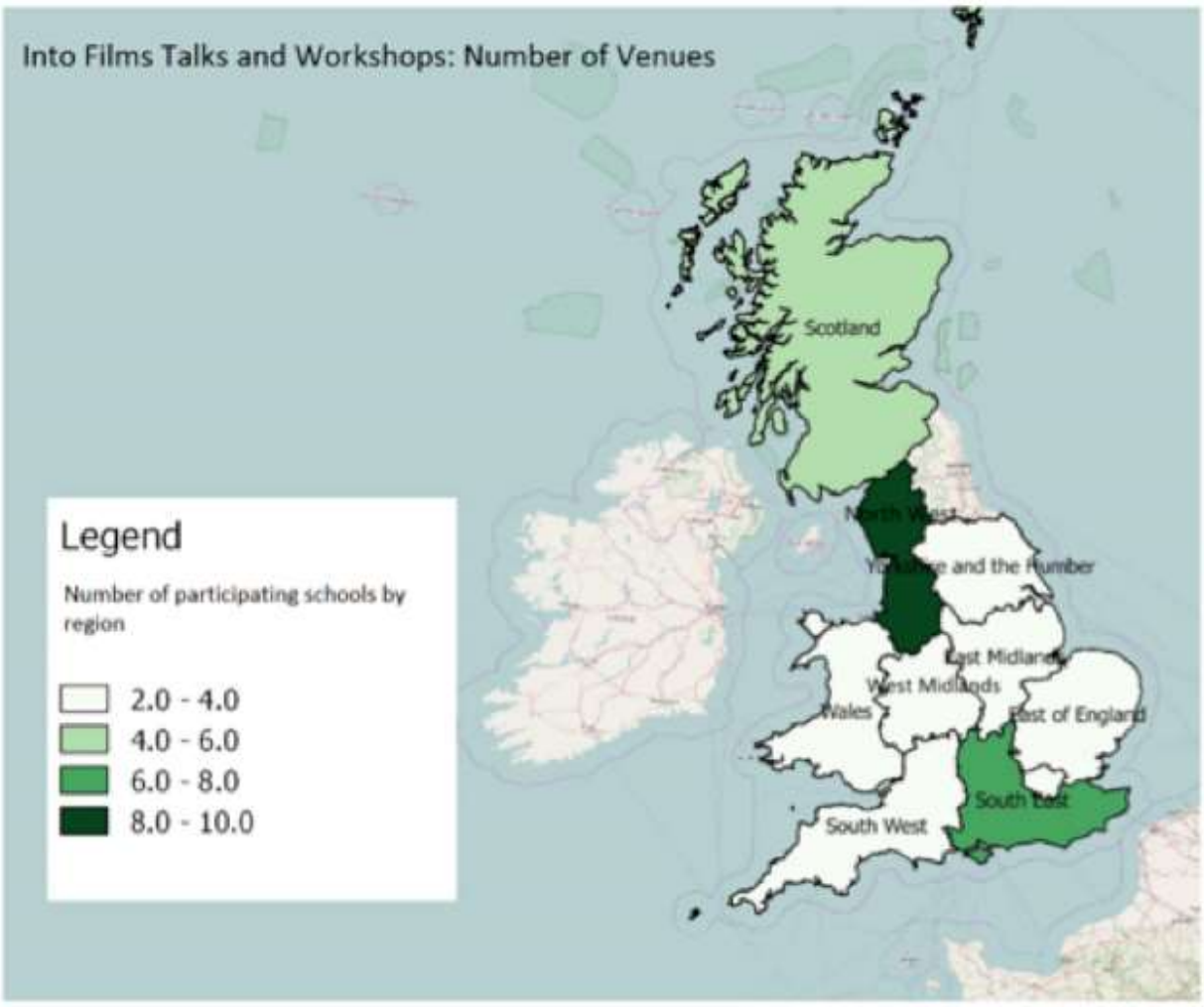
The talks and workshops were held across 40 venues that hosted in England, Scotland and Wales. Close to half of all participants that attended these events came from the South East and the North West. This is not surprising as these two regions had the most number of venues. Interestingly, none of the events were held in the North East.

**Table 60: Geographical distribution of participants of Into Film talks and workshops**

| **Geographical regions** | **Venues** | **Participants** | |
|---|---|---|---|
| East Midlands | 2 | 235 | 4% |
| West Midlands | 2 | 170 | 3% |
| North East | 0 | 0 | 0% |
| North West | 10 | 1198 | 22% |
| East of England | 3 | 291 | 5% |
| London | 3 | 577 | 11% |
| South East | 8 | 1441 | 26% |
| South West | 2 | 61 | 1% |
| Yorkshire and the Humber | 2 | 330 | 6% |
| Scotland | 5 | 721 | 13% |
| Wales | 3 | 440 | 8% |
| **Total** | 40 | 5464 | 100% |

The distribution map (Figure 24) shows that the talks and workshops attracted a large number of schools in the South East and North West. Wales and Scotland were represented as well.

**Figure 24: Geographical spread of the Into Film talks and workshops**




This project has also attracted schools from a range of locality. This is fairly representative of the national distribution of schools. No schools from rural hamlets were represented here (Table 61).

**Table 61: Locality of participating schools**

| | Number of schools | | National (%) | Number of participants | |
|---|---|---|---|---|---|
| Urban conurbation | 13 | 33% | 32.6 | 1743 | 32% |
| City and town | 14 | 35% | 40.9 | 2114 | 39% |
| Rural town and village | 5 | 13% | 20.6 | 446 | 8% |
| Rural hamlet and isolated | 0 | 0% | 5.1 | 0 | 0% |
| Scotland | 5 | 13% | | 721 | 13% |
| Wales | 3 | 8% | | 440 | 8% |
| Others | | | 0.7 | | |
| **Total** | 40 | 100% | 99.9% | 5464 | 100% |

# PRINCIPIA SCHOOLS CONFERENCES

This was a pair of conferences organised by the UK Space Agency and held in the University of Portsmouth and University of York to showcase the work done by students across the UK regarding Tim's mission. Students presented their work through traditional presentation format, but some chose to perform a dance, song or rap. On exhibition were students' entries for the poster competition. Schools had to apply to attend the conference. Each school took on average six to seven students to these conferences accompanied by one to three adults (usually teachers). We count only the student participants. A total of 13,743 young people were known to have attended these conferences.

## Who are the participants in the Principia Schools Conferences?

A total of 170 registrations were received for the two conferences. Over a third of the registrations came from primary schools and under a third from the secondary sector (Table 62). Primary school participants made up over half of all the participants. There were a number of registrations that came from the public, for example, parents, home educators, clubs and other organisations. These were often single registrations and they represented 7% of all participants.

**Table 62: Principia Schools conference participants by phase of schooling**

| School phase | Number of schools | | Number of participants | |
|---|---|---|---|---|
| Primary age | 65 | 38% | 7,625 | 55% |
| Secondary age | 46 | 27% | 4499 | 33% |
| All through | 19 | 11% | 718 | 5% |
| Not schools/Unknown | 39 | 23% | 901 | 7% |
| **Total** | 170 | 100% | 13,743 | 100% |

Note: Not schools/Unknown refers to registrations not affiliated to schools or where no data was provided.

Academies and other autonomous schools accounted for a third of the registrations and a third of all the participants. Together with Community schools they represent almost half of all registrations (Table 63). Over 60% of all participants came from these schools.

Although Independent schools made up only 16% of all participants, proportionately they are higher than the national average. Community schools, on the other hand, are under-represented, so are Voluntary schools.

**Table 63: Types of schools that take part in the conferences**

| Types of schools | Number of schools | % | National (%) | Number of participants | % |
|---|---|---|---|---|---|
| Academy | 51 | 30 | 24.6 | 5,285 | 38 |
| Community school | 30 | 18 | 30.8 | 3597 | 26 |
| Voluntary school | 18 | 11 | 20.5 | 2648 | 19 |
| Independent school | 27 | 16 | 6.9 | 1266 | 9. |
| Parents | 19 | 11 | | 29 | 0.2 |
| Home educator | 8 | 5 | | 28 | 0.2 |
| Scotland | 6 | 4 | | 432 | 3 |
| Wales | 2 | 1 | | 2 | 0.01 |
| Others | 9 | 5 | 7.0 | 456 | 3 |
| **Total** | 170 | 100 | 100.1 | 13743 | 100 |

Note: Others include clubs (e.g. scouts, gardening society, space club and football club), private institutions, individual student and one childcare centre.

## Where do participants come from?

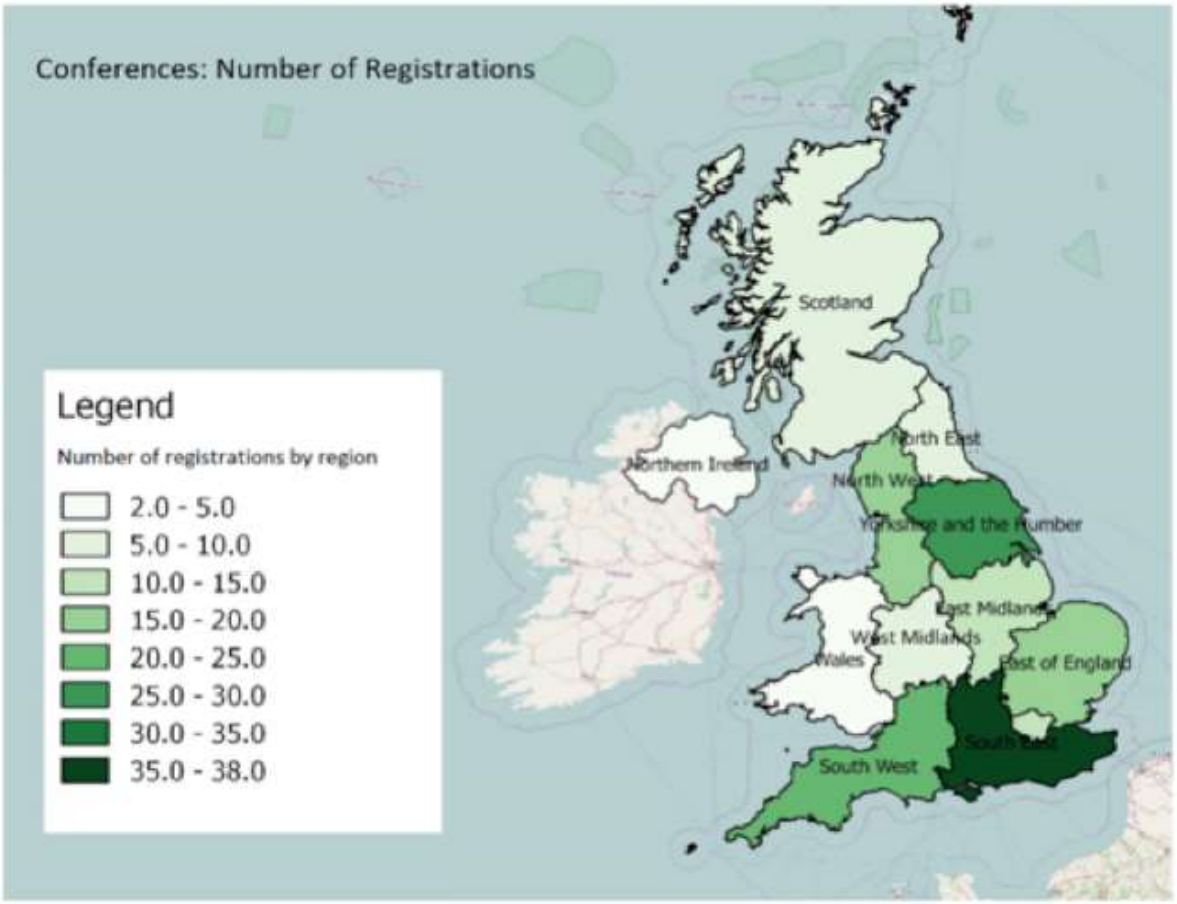
Of the 170 registrations, 161 were from England but not all were from schools as entries came from parents, home educators and private clubs and organisations. Table 64 shows that proportionately most of the registrations came from the South East and Yorkshire and the Humber. Counting England alone, the North East and the West Midlands are underrepresented. There were fewer entries from London than expected.

**Table 64: Geographical distribution of participants in the Principia conferences**

| Geographical regions | Number of registrations | % |
|---|---|---|
| East Midlands | 14 | 8.2 |
| West Midlands | 8 | 4.7 |
| North East | 7 | 4.1 |
| North West | 17 | 10.0 |
| East of England | 15 | 8.8 |
| London | 12 | 7.1 |
| South East | 35 | 20.6 |
| South West | 23 | 13.5 |
| Yorkshire and the Humber | 30 | 17.6 |
| Scotland | 7 | 4.1 |
| Wales | 2 | 1.2 |
| **Total** | 170 | 100 |

The map (Figure 25) shows visually that most the registrations were concentrated in the South East and the Yorkshire region.

**Figure 25: Geographical distribution of participants**




We have information about the types of locality for most school registrations, but not those from the public. Forty-seven of the registrations from the public (parents, individuals, clubs and organisations) could not be determined.

**Table 65: Locality of Conference registration**

| **Types of locality** | **Number of registrations** | **%** |
|---|---|---|
| Urban conurbation | 31 | 18.2 |
| Urban city and town | 69 | 40.6 |
| Rural town and village | 24 | 14.1 |
| Rural hamlet and isolated | 3 | 1.8 |
| Cannot be determined | 43 | 25.3 |
| **Total** | 170 | 100 |

# THREE MINUTE LEARNING (3ML)

Three Minute Learning (3ML) is an online resource for schools that locates spaceflight firmly within modern culture. At the heart of 3ML are hundreds of short stories on space, science, engineering, arts and society. A number of these stories are based on interviews with Principia personnel, including Tim Peake. The idea is that repeated use of 3ML would help pupils to become more active readers. Pupils' progress in their reading could be tracked and used to direct teaching and support. Engagement and achievement are rewarded. The use of computer games and social media was aimed to motivate pupils at all levels of attainment.

Analyses of the data were performed on registrations for online accounts and online activities. The number of active users varied across schools. Some schools have only a few active users. St Andrew's RC secondary in Scotland had over 800 active users. Schools that registered but did not proceed were not included in the analyses.

At the time of the analyses there were 3,493 active accounts. The database shows 21,463 activities completed in total since the 3ML Principia Library was launched. In reality the number would be much higher as some residential schools and specialist units were using the resources offline as they did not want their pupils' responses to be shared online. Some primary schools have used the resources offline as they have found it useful for guided reading. There is no way of recording these activities as teachers print off the PDF resources for use with their students. Some secondary schools did not have stable internet access and have thus used the texts offline for whole class discussion.

## Who are the participants?

A total of 79 institutions registered for the 3ML project. Of these a large majority (n= 60) was from Scotland, representing 75% of total registrations. 15 schools were from England and four from Wales. 75% of the schools from England were primary schools, but the majority from Scotland were All Through schools that have both primary and secondary phases (Table 66).

Scotland recorded the highest number of users. It had 3,038 users representing 87% of the total. 263 came from England and another 92 from Wales. However the actual number of users would be higher because a number were using the resources off line. This number could not be ascertained. England and independent schools appear to be seriously underrepresented (Table 66).

Over three quarters (76%) of users came from schools which have both the primary and secondary sectors (All Through schools). One reason could be the large number of schools in Scotland which were mostly All Through schools. What is striking is that the 3ML project is not particularly popular with secondary school pupils.

**Table 66: 3ML registrations in UK and the phase of schooling**

| Country | Number of schools | | Number of users | |
|---|---|---|---|---|
| Scotland | 60 | 75% | 3,038 | 87% |
| England | 15 | 27% | 363 | 10% |
| Wales | 4 | 5% | 92 | 3% |
| **Total** | 79 | 100% | 3493 | 100% |
| | | | | |
| **Phase of schooling** | | | | |
| Primary | 26 | 33% | 548 | 16% |
| Secondary | 2 | 3% | 190 | 5% |
| All Through | 41 | 52% | 2661 | 76% |
| Unknown | 10 | 13% | 94 | 3% |
| **Total** | 79 | 100% | 3493 | 100% |

Note: The numbers are based only on those who used the resources online

Over three-quarters of the schools were from Scotland. Of those from England, most were Academies and Community schools. Only one pupil from an independent school in England took part.

**Table 67: 3 Minute Learning participants by types of school**

| **Types of schools** | **Number of schools** | | **Number of users** | |
|---|---|---|---|---|
| Academy | 5 | 6.3% | 157 | 4% |
| Community school | 6 | 7.5% | 22 | 1% |
| Voluntary school | 3 | 5.0% | 183 | 5% |
| Independent school | 1 | 1.3% | 1 | 0.0% |
| Scotland | 60 | 75% | 3,038 | 87% |
| Wales | 4 | 5.0% | 92 | 3% |
| **Total** | 79 | 100% | 3493 | 100% |

The schools in England that took part in the online activity tended to be 'good' schools with either good or outstanding Ofsted ratings. They were also below the national average in terms of pupils eligible for FSM but more likely to have pupils whose first language was not English.

**Table 68: Levels of disadvantage of 3 Minute Learning schools**

| **Indicators of disadvantage** | **Schools** | **National average** |
|---|---|---|
| %FSM | 9.4 | 13.3 |
| %EAL | 20.4 | 13.0 |
| School size | 396 | 350 |

## Where do participants come from?

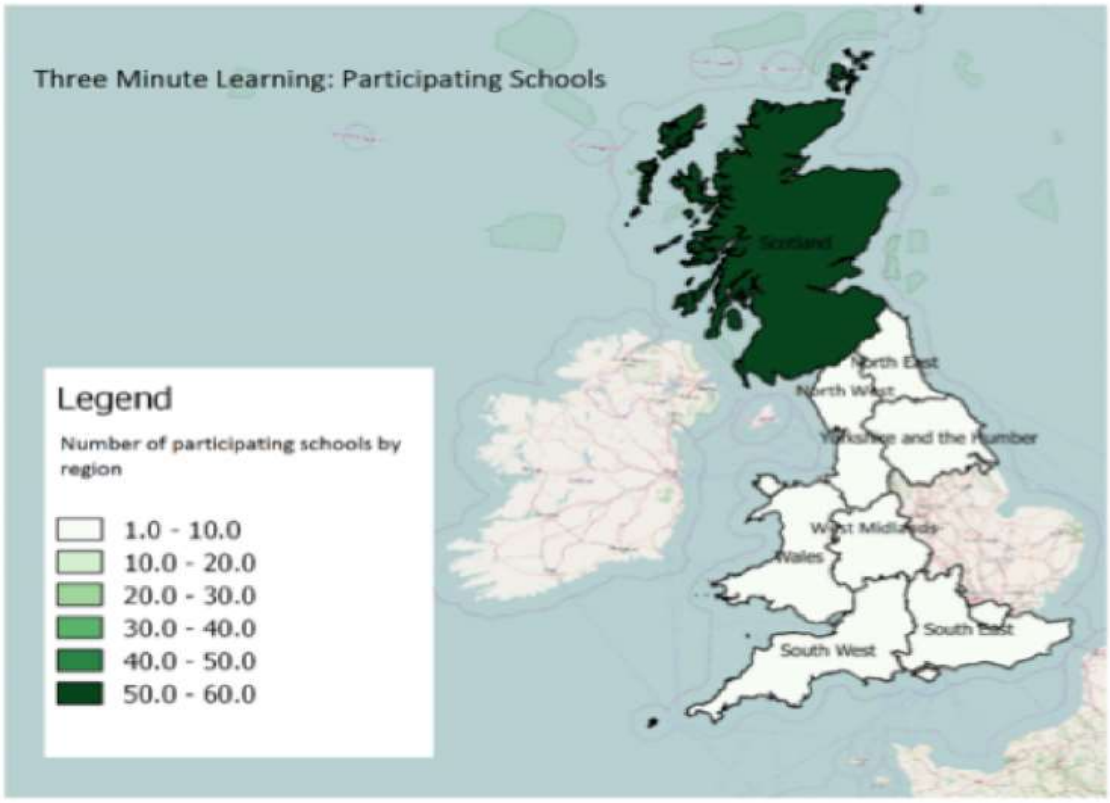
This project was particularly attractive to schools in Scotland and remote parts of the country due to its availability on the internet and the possibility for teachers to download materials directly for use in the classroom.

An overwhelming majority (87%) of the 3-Minute Learning participants were from Scotland (Figure 26). Of these almost a third came from Fife (29%) and over a quarter came from Dumfries and Galloway (28%). Participants from England were mainly from the South East. There were no participants from the East Midlands and East of England. The map shows the heaviest concentration of schools in Scotland, and no from East of England and East Midlands represented (Table 69).

**Table 69: Geographical distribution of 3 Minute Learning schools and participants**

| | **No of schools** | **%** | **Number of online participants** | **%** |
|---|---|---|---|---|
| East Midlands | 0 | 0.0 | 0 | 0.0 |
| West Midlands | 1 | 1 | 55 | 1.6 |
| North East | 1 | 1.3 | 20 | 0.6 |
| North West | 2 | 2.5 | 1 | 0.0 |
| East of England | 0 | 0.0 | 0 | 0.0 |
| London | 2 | 2.5 | 1 | 0.0 |
| South East | 2 | 2.5 | 190 | 5.4 |
| South West | 3 | 3.8 | 0 | 0.0 |
| Yorkshire and the Humber | 4 | 5.1 | 96 | 2.7 |
| Wales | 4 | 5.1 | 92 | 2.6 |
| Scotland | 60 | 75.9 | 3,038 | 87.0 |
| **Total** | 79 | 100.0 | 3493 | 100.0 |

**Figure 26: Geographical distribution of 3 Minute Learning schools**




## Users in Scotland

The highest number of users in Scotland came from schools with both primary and secondary sectors (e.g. the academies, grammar schools and high schools). All of the schools in Scotland were state schools. No independent schools were represented.

**Table 70: 3 Minute Learning - Scottish schools**

| **Phase of schooling (for Scotland)** | **Number of schools** | | **Number of users** | |
|---|---|---|---|---|
| Primary | 14 | 23% | 376 | 12.4% |
| All Through | 40 | 67% | 2660 | 87.6% |
| Unknown | 6 | 10% | 2 | 0.0% |
| **Total** | 60 | 100% | 3038 | 100% |

## Where do the participants in Scotland come from?

From the postcodes given we were able to ascertain where the schools are in Scotland were. Table 71 for Scotland shows that most of the online users came from only two places: Dumfries and Galloway and Fife. There were some schools with no online participants suggesting that they were using the resources offline.

**Table 71: Location in Scotland of 3 Minute Learning schools and participants**

| | No of schools | Number of online participants | % |
|---|---|---|---|
| Aberdeenshire | 3 | 1 | 0.0% |
| Argyll and Bute | 1 | - | - |
| Dumfries and Galloway | 9 | 841 | 27.7% |
| Dundee City | 1 | 485 | 16.0% |
| East Ayrshire | 1 | - | - |
| South Ayrshire | 1 | 1 | 0.0% |
| East Dunbartonshire | 1 | 44 | 1.4% |
| West Dunbartonshire | 1 | - | - |
| East Lothian | 2 | - | - |
| West Lothian | 3 | 3 | 0.1% |
| Midlothian | 2 | 51 | 1.7% |
| East Renfrewshire | 1 | 52 | 1.7% |
| Edinburgh City | 1 | - | - |
| Falkirk | 1 | 186 | 6.1% |
| Fife | 4 | 882 | 29.0% |
| Glasgow City | 4 | - | |
| Highland | 6 | 13 | 0.4% |
| Moray | 2 | 39 | 1.3% |
| North Lanarkshire | 4 | 290 | 9.5% |
| South Lanarkshire | 3 | 105 | 3.5% |

| | | | |
|---|---|---|---|
| Scottish Borders | 1 | 1 | 0.0% |
| Stirling | 2 | 42 | 1.4% |
| Not found | 6 | 2 | 0.1% |
| **Total** | 60 | 3038 | 100% |

# I'M AN ASTRONAUT, GET ME OUT OF HERE

The 'I'm an astronaut…' programme, in association with Gallomanor, invited students to engage with members of the Astro Support team. This team includes the engineers, scientists, technicians, astronaut instructors, medics, flight controllers and other individuals who helped to make the Principia mission possible and a success. Students were able to ask questions of the team and participate in text-based live-chats with them. They were then able to vote for their favourite team member to win a prize of £500 to communicate their work with the public. The Astro Support team also nominated a class to participate in the final live chat which involved a question and answer session with Tim Peake. The whole programme consisted of four rounds which took place between Autumn 2015 and Summer 2016.

The 'I'm an astronaut…' activity was delivered online and was free for schools to participate in. Primary, secondary and post-16 institutions from across the UK were invited to be involved in the programme. A total of 86 schools took up the invitation. Further details about the schools are described below.

## Who are the participants?

The data suggest that this programme was most popular with secondary schools. Two thirds of schools involved served secondary age children while nearly a quarter were primaries (Table 72). Two middle schools participated as did seven all-through schools. We do not have data on whether the children from all-through schools were primary or secondary-aged or a mix.

**Table 72: Participants of 'I'm an Astronaut' by phase of schooling**

| School Phase | Number | Percentage | National (%) |
|---|---|---|---|
| Primary | 19 | 22.6 | 68.9 |
| Secondary | 57 | 67.9 | 12.9 |
| All Through | 7 | 8.3 | 0.5 |
| 16 Plus | 1 | 1.2 | 1.6 |
| Others (including middle schools) | 2 | 2.3 | 16.1 |
| **Total** | 84 | 100.0 | 100.0 |

There may be a number of reasons why this particular programme was more popular with secondaries. This could have been because the content of the activities (online questioning of and discussion with the Astro Space team) was deemed more appropriate for older children. Second, as the programme was aimed at pupils aged 7 upwards, this means that children in Key Stage 1 (aged 4-6) were unable to participate, reducing the number of primary teachers and pupils who were eligible to get involved. It may also be the case that the specialist science and technology teachers found in secondary schools were more motivated to involve their pupils via their specific subject area.

About half of the schools involved were academies (either converter or sponsor-led) or free schools. A third were community schools and the remainder included voluntary aided or controlled schools or foundation schools and one further education college (Table 73).

**Table 73: Participants by types of school**

| Establishment Type | Number | Percentage | National (%) |
|---|---|---|---|
| Community School* | 28 | 32.6 | 30.8 |
| Academy/Free School* | 45 | 52.3 | 21.1 |
| Voluntary Aided | 8 | 9.3 | 12.5 |
| Voluntary Controlled | 2 | 2.3 | 6.2 |
| Foundation | 2 | 2.3 | 3.5 |
| Further/Higher Education | 1 | 1.2 | 1.8 |
| **Total** | 86 | 100.0 | |

*includes one special school

No independent schools participated in the 'I'm an astronaut…' project despite these schools accounting for seven per cent of establishments across England. Two special schools were involved in the programme (one academy and one community school).

Schools involved in this project were in line with the national average in terms of levels of disadvantage (Table 74).

**Table 74: Levels of disadvantage of participating schools**

| Indicators of disadvantage | 'I'm an astronaut…' average | National average |
|---|---|---|
| % FSM Eligible | 13.5 | 13.3 |
| % EAL | 12.0 | 13.0 |

The data that we have indicate that from the 86 participating schools, a total of approximately 1,750 pupils were involved. This provides an average of approximately 20 students per school although there is likely to be considerable variation depending on school size and the number of rounds that they participated in.

Table 75 shows that a slightly higher proportion of boys participated overall although there were a number of children who did not state their gender when asked.

**Table 75: Gender breakdown of participants**

| Gender | Count of student | Percentage |
|---|---|---|
| Girls | 775 | 44.4 |
| Boys | 885 | 50.7 |
| Did not say | 85 | 4.9 |
| **Total** | 1745 | 100.0 |

It is interesting to note that this project attracted students largely in the transition age from primary to secondary (age 11 to 14).

**Table 76: Age breakdown of participants**

| Age | Count of student | Percentage |
|---|---|---|
| 7 | 5 | 0.3 |
| 8 | 9 | 0.5 |
| 9 | 64 | 3.7 |
| 10 | 122 | 7.1 |
| 11 | 257 | 15.0 |
| 12 | 384 | 22.4 |
| 13 | 455 | 26.6 |
| 14 | 249 | 14.5 |
| 15 | 87 | 5.1 |
| 16 | 46 | 2.7 |
| 17 | 25 | 1.5 |
| 18 | 9 | 0.5 |
| **Total** | 1712 | 100.00 |

Very few children at the lower end of the target age (7 and 8 years) participated and 10% were aged 9 or 10 years old. It is not clear to what extent the 11 year olds (the age when the majority of children transition between primary and secondary school) included here were predominantly to be found in primary schools or secondary schools. Just under 10% of the participants were aged 15 or over.

As we can see the total in the ‘age’ table is different to that in the ‘gender’ table. It is not clear whether there are some missing values from the data on students’ ages.

## Where do participants come from?

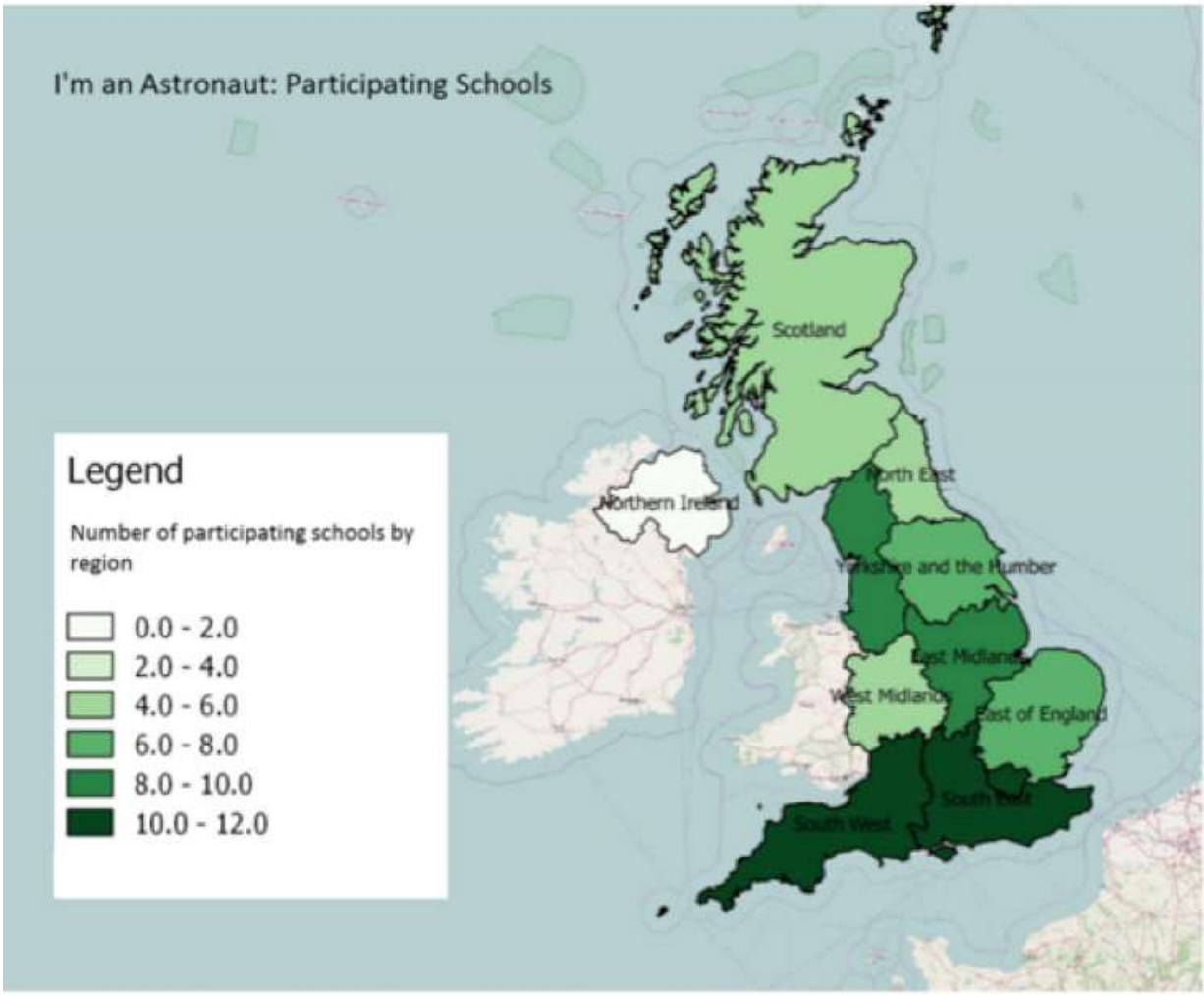
Table 77 below shows the geographical spread of the schools involved in the 'I'm an astronaut…' programme. The percentages of schools involved are, on the whole, broadly in line with the national figures. There are two main exceptions here. The first is the South West region where a slightly higher proportion of schools than might be expected participated. Second, no Welsh schools participated in this programme. This might be partly explained by how/where the programme was promoted to schools.

**Table 77: Geographical distribution of participating schools**

| Region | Number | Percentage | National (% England and Wales) |
|---|---|---|---|
| East Midlands | 10 | 11.6 | 8.5 |
| East of England | 8 | 9.3 | 10.7 |
| London | 11 | 12.8 | 12.1 |
| North East | 5 | 5.8 | 4.5 |
| North West | 9 | 10.5 | 13.3 |
| South East | 12 | 14.0 | 15.9 |
| South West | 12 | 14.0 | 8.9 |
| West Midlands | 5 | 5.8 | 10.1 |
| Yorkshire and Humber | 8 | 9.3 | 9.2 |
| Scotland | 5 | 5.8 | N/A |
| Wales | 0 | 0.0 | 6.2 |
| Northern Ireland | 1 | 1.2 | N/A |
| Channel Islands | 0 | 0.0 | N/A |
| **Total** | 86 | 100.0 | |

As shown on the map (Figure 27), most of the participating schools are concentrated in the South of England.

**Figure 27: Geographical distribution of participating schools**




The majority of schools in this project (over 75%) were located in urban areas (cities, towns or major conurbations) while 15% could be found in more rural areas. This is in line with the national distribution of schools (Table 78). Five of the schools termed 'other/unknown' are based in Scotland, a country for which we do not have classifications for area type. It does appear, however, that two of these are based in the city of Glasgow while another, for example, is situated in a very rural part of the Shetland Isles, highlighting the range of areas that were reached by the project.

**Table 78: Locality of participating schools**

| Types of locality | Number | Percentage | National percentage (England and Wales) |
|---|---|---|---|
| Urban City and town | 40 | 46.5 | 39.7 |
| Urban major conurbation | 25 | 29.1 | 31.7 |
| Rural town and village | 10 | 11.6 | 18.5 |
| Rural hamlet and isolated dwellings | 4 | 4.7 | 9.6 |
| Other/Unknown | 7 | 8.1 | 5.0 |
| **Total** | 86 | 100.0 | 100.0 |

# COSMIC CLASSROOM

This was a one-hour live lesson from space, which was live streamed and supported by teaching resources. TES analysed the data and estimated that 400,000 children took part in the lesson online. The full lesson from space is available on YouTube and can be viewed here: https://www.youtube.com/watch?v=mRuBvf-Qrno (over 35,000 views at time of writing).

The data provided by TES includes all the schools that registered to take part in advance. The data only gives the geographical coordinates (in latitude and longitude) and a breakdown of school type. Using the coordinates given we identify the schools to determine their characteristics and their location.

As the Cosmic Classroom data are currently incomplete the following statistics are based on 10,116 (85.5%) of the 11,830 entries. Note that the data for this project can only be an estimate since the coordinates do not always give precise locations. The data presented here were based on our judgments.

## Who are the participants?

The majority of the participating schools were primary schools and 15% were secondary. These were proportionately higher than the national average.

**Table 79: Participating schools by phase of schooling**

| School phase | Number of Schools | % | National (%) |
|---|---|---|---|
| Primary | 7721 | 76.3 | 68.9 |
| Secondary | 1506 | 14.9 | 12.9 |
| Post-16 | 46 | 0.4 | 1.6 |
| All through | 18 | 0.2 | 0.5 |
| *Others | 825 | 8.2 | 16.1 |
| **Total** | 10116 | 100 | 100 |

*'Others' includes schools outside England (e.g. Isle of Man, Jersey and Guernsey, Gibralta, Wales and Scotland) and special schools. Primary includes nursery and pre-schools

## Where do participants come from?

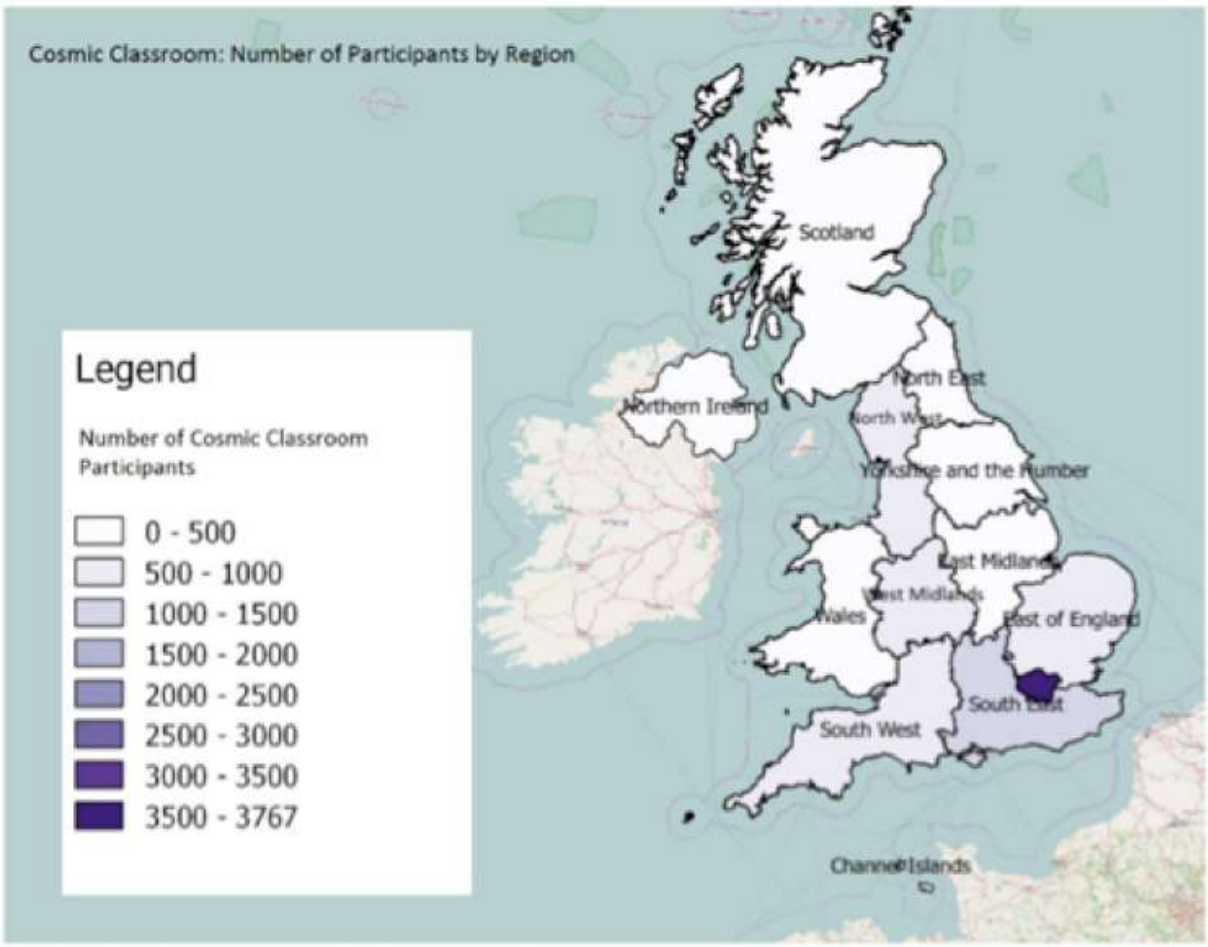
Over a third of the schools were based in London. The North East is again seriously underrepresented (Table 80).

**Table 80: Geographical distribution of participating schools**

| Region | Number | Percentage | National percentage (England and Wales) |
|---|---|---|---|
| East Midlands | 278 | 2.7 | 8.5 |
| East of England | 827 | 8.2 | 10.7 |
| London | 3767 | 37.2 | 12.1 |
| North East | 148 | 1.5 | 4.5 |
| North West | 705 | 7 | 13.3 |
| South East | 1383 | 13.7 | 15.9 |
| South West | 688 | 6.8 | 8.9 |
| West Midlands | 650 | 6.4 | 10.1 |
| Yorkshire and Humber | 472 | 4.7 | 9.2 |
| Scotland | 436 | 4.3 | NA |
| Wales | 353 | 3.5 | 6.2 |
| Northern Ireland | 65 | 0.6 | N/A |
| Isle of Man | 2 | 0 | N/A |
| Channel Islands | 31 | 0.3 | N/A |
| Outside the UK | 311 | 3.1 | N/A |
| **Total** | 10116 | 100.0 | |

The map below (Figure 28) shows where the Cosmic Classroom participants in UK came from. As can be seen most of them are concentrated in the London region.

**Figure 28: Geographical distribution of Cosmic Classroom schools**




Over half of schools that took part in Cosmic Classroom were from large urban conurbations, and a third from urban towns and cities. Close to 400 schools were from small isolated rural villages (Table 81).

**Table 81: Locality of participating schools**

| Location | Number | Percentage | National Average (%) |
|---|---|---|---|
| Urban Conurbation | 5371 | 53.1 | 41.1 |
| Urban City and town | 3029 | 29.9 | 44.3 |
| Rural town and village | 1042 | 10.3 | 12.5 |
| Rural hamlet and isolated dwellings | 379 | 3.8 | 2.2 |
| Other/Unknown | 295 | 2.9 | 0.1 |
| **Total** | 10116 | 100 | 100.0 |

## Schools outside England

195 schools were from outside England, the majority of these were primary schools. The distribution map below (Figure 29) shows the global interest of the project across the world. Each point represents a school outside England.

**Figure 29: Global distribution of Cosmic Classroom schools**

# TEAM TIM SHOWS

Team Tim is an interactive science show delivered by a team of trained presenters, which features a 'live' satellite interview with Tim Peake. The show is full of fun, learning and visual effects. Students help Tim to keep fit, do quick calculations, conduct science experiments and perform a thrilling spacewalk to fix the ISS. Team Tim performed at schools for a modest charge. They also aimed to get to particularly remote areas of the UK, and some of the shows are held in public venues, such as at the Royal Aeronautical Society in London, University of Bath and the Ministry of Air Museum in Yeovil.

To calculate the reach of these shows we include all the bookings at the time of writing the report, even though some of the shows have been booked but were not performed yet at the time of the report. Overall a total of 143 institutions were involved. Some shows were performed in public spaces or in universities and aeronautical societies and museums.

## Who are the participants?

To date a total of over 31,000 school children had signed up for this programme, a large majority of these were primary school aged children (Table 82).

**Table 82: Participants by phase of schooling**

| School phase | Number of schools | | Participants | |
|---|---|---|---|---|
| Primary | 128 | 90% | 26149 | 84% |
| Secondary | 7 | 5% | 3595 | 12% |
| All Through | 8 | 6% | 1270 | 4% |
| **Total** | 143 | 100% | 31014 | 100 |

Note: One of the shows was held at a University for teachers. For the purpose of this report we included only student participants. Teacher participants were therefore excluded from all analyses, although it was estimated that around 2000 teachers were involved.

The school types participating in Team Tim reflected the type and range of schools in England (Table 83). In terms of the kinds of pupils taking part in Team Tim, those from Community and Voluntary schools were slightly overrepresented, while those from Academies were underrepresented compared to the national picture.

**Table 83: Participants by types of establishment**

| | Number of establishments | | National (%) | Number of participants | | National (%) |
|---|---|---|---|---|---|---|
| Academy | 37 | 25% | 24.6 | 6941 | 22% | 40.9 |
| Community school | 49 | 34% | 30.8 | 11240 | 36% | 34 |
| Voluntary school | 36 | 25% | 20.5 | 7717 | 25% | 16.2 |
| Independent school | 10 | 7% | 6.9 | 2241 | 7% | 6.8 |
| *Others | 14 | 10% | 17.2 | 2875 | 9% | 2.1 |
| **Total** | 146 | 100% | 100 | 31014 | 100% | 100 |

*The 'Others' includes participants who took part in the programme via charity and public organisations as well as some home educators.

To establish the proportion of disadvantaged schools represented we compare schools participating in Team Tim with the national average. Table 84 shows that on the whole the schools taking part in Team Tim are representative of the national average albeit with a slightly higher proportion of disadvantaged schools. They also tend to be slightly larger schools.

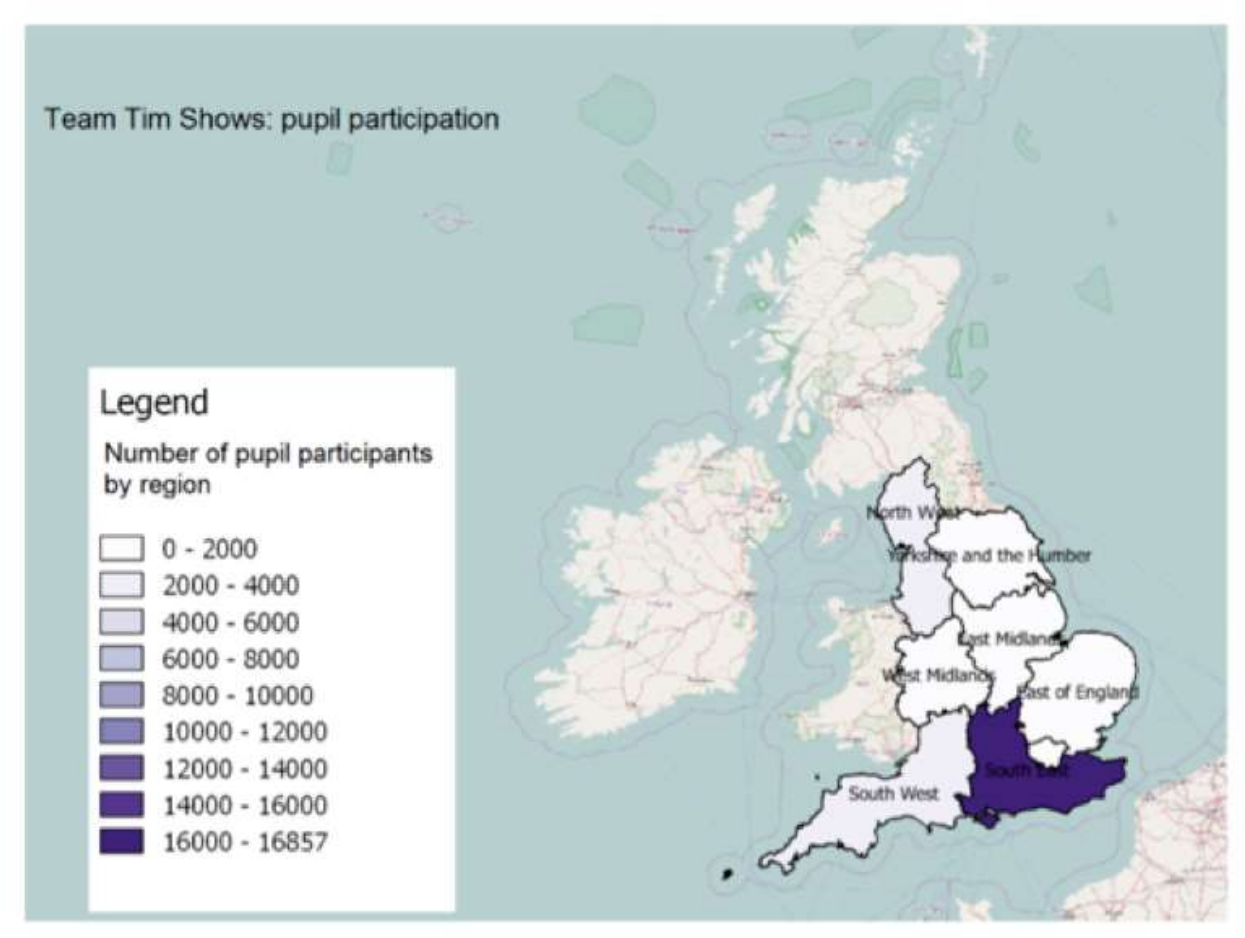
**Table 84: Levels of disadvantage of participating schools**

| | **Team Tim Schools** | **National average** |
|---|---|---|
| %FSM | 13.7 | 13.3 |
| %EAL | 14.7 | 13.0 |
| School size | 375 | 350 |

## Where do participants come from?

As can be seen from the map, most of the participants of the Team Tim shows are located in the South East.

**Figure 30: Geographical distribution of Team Tim participants**




Over half of the schools came from the South East (Table 85). All of the other regions were underrepresented. No school from the North East was represented.

**Table 85: Geographical distribution of participating schools**

| Region | Number | Percentage | National (%) |
|---|---|---|---|
| East Midlands | 3 | 2% | 8.5 |
| West Midlands | 4 | 3% | 10.1 |
| North East | 0 | 0% | 4.5 |
| North West | 8 | 5% | 13.3 |
| East of England | 9 | 6% | 10.7 |
| London | 20 | 14% | 12.1 |
| South East | 83 | 57% | 15.9 |
| South West | 9 | 6% | 8.9 |
| Yorkshire and Humber | 10 | 7% | 9.2 |
| Wales | | | 6.2 |
| Others | | | 0.6 |
| **Total** | 146 | 100% | 100 |

Comparing the pupil participants with the national spread of pupil population, the South East was considerably overrepresented. Over half of all participants came from the South East, in particular Kent, Surrey and Sussex (Table 86).

There were no participants from the North East at all. It has to be noted that there were some public venues where we have no information on where the participants came from. Also, there were two school

venues which included participants from 'Other schools'. We have no information what these other schools were. It may well be that some of the participants in these venues came from the North East.

**Table 86: Geographical distribution of pupil participants**

| Region | Number | Percentage | National (%) |
|---|---|---|---|
| East Midlands | 930 | 3% | 8.3% |
| West Midlands | 600 | 2% | 10.8% |
| North East | 0 | 0% | 2.9% |
| North West | 2060 | 7% | 15.0% |
| East of England | 1942 | 6% | 11.1% |
| London | 4380 | 14% | 16.4% |
| South East | 16857 | 54% | 12.5% |
| South West | 2285 | 7% | 12.9% |
| Yorkshire and Humber | 1960 | 6% | 9.9% |
| Others | | | 0.2% |
| **Total** | 31014 | 100% | 100 |

Close to half of these participating schools were from the urban towns and cities (Table 87). This is roughly representative of the national distribution of schools.

**Table 87: Locality of participating schools**

| Types of locality | Number of schools | % | National (%) |
|---|---|---|---|
| Urban conurbation | 36 | 25% | 32.6 |
| Urban city and town | 71 | 49% | 40.9 |
| Rural town and village | 29 | 20% | 20.6 |
| Rural hamlet and isolated dwellings | 10 | 7% | 5.1 |
| Others | | | 0.7 |
| **Total** | 136 | 100% | 200 |

Over half of the participants were from urban cities and towns (Table 88). This is not surprising since most of the schools are concentrated in these places, but compared to the national distribution participants from urban conurbations were underrepresented, and those from rural settings were overrepresented.

**Table 88: Locality of pupil participants**

| Types of locality | Number of participants | % | National (%) |
|---|---|---|---|
| Urban conurbation | 8910 | 29% | 41.1 |
| Urban city and town | 16556 | 53% | 44.3 |
| Rural town and village | 4112 | 13% | 12.5 |
| Rural hamlet and isolated dwellings | 1436 | 5% | 2.2 |
| Others | | | 0.1 |
| **Total** | 31014 | 100% | 100 |

# ONE GIANT READ

One Giant Read is a Literature Works project in partnership with The UK Space Agency, ESA, RNIB and supported by Plymouth University. It is an online, shared reading experience designed to bring space sciences and STEM subjects to diverse audiences. During each month of Tim Peake's mission the audience was offered a new theme of content to explore the ways science fiction inspired science fact. Each month included new features including audio book extracts from authors ranging from Alastair Reynolds to HG Wells, classic and contemporary poetry from poets such as John Clare, Sir Andrew Motion and Simon Barraclough. In addition, there were writer profiles, interviews and book reviews. Interviews were also held with scientists to hear how science fiction matches up to science fact and why they were inspired to become scientists.

There is no data for analysis but we do know that there were 58,715 page views overall for the website and 6,465 page views of Principia specific content.

# GREAT BRITISH SPACE DINNERS

Great British Space Dinners is a project where children were invited to design a healthy balanced menu for Tim Peake to eat in space. Students were supported with education resources and videos from famous chef, Heston Blumenthal. Most entries were group projects so one entry may have involved more than one child.

We did not analyse the data as it is in paper format that has not been digitized. However, the information provided to us indicates that 344 entries were received from 60 primary schools, 27 individuals and various clubs and organisations. This represented approximately 880 named children. From the secondary sector, a total of 179 entries were received from approximately 50 schools, 13 individuals and various clubs and societies, representing approximately 920 named children.

In total 523 were received from approximately 110 schools involving over 2,000 children across age groups. However, in reality this figure would be higher as some schools only submitted their best entry.

# ASTRO ACADEMY: PRINCIPIA

The National Space Academy created resources and held CPD sessions (Continuing Professional Development) for teachers. Tim Peake conducted and filmed a series of simple demonstrations on the International Space Station (ISS) using a set of kits designed and built by the National Space Academy to illustrate fundamental aspects of physics and chemistry curricula, comparing results in micro-gravity with those in classrooms on Earth for the project "Astro Academy: Principia".

The demonstrations covered secondary science topics such as circular motion, collision physics, kinetic theory of gases and harmonic motion, using systems which act differently under Earth gravity than in the micro-gravity environment on the ISS. Tim's demonstrations were put together with some Earth-based filming to create a series of five films. These were accompanied by written teacher guides using the classroom expertise of the National Space Academy, whose UK wide team is comprised of award winning and Ofsted rated "outstanding" subject specialist teachers with years of experience and excellent records of exam results. The films were aimed primarily at UK secondary school teachers, but post-production techniques enabled the films to be used in dynamical analysis lessons up to A Level and by first year undergraduates. The video clips of Tim were also been released as standalone clips which teachers can use independently in their lessons.

There is no data on student participation for this project, so analysis is at the school level. The schools are those that have sent teachers to the Astro Academy: Principia CPD sessions. This is an ongoing work and further CPD sessions have been arranged to take place, but data from October 2016 to February 2017 indicated that a total of 64 teachers from 64 schools and university colleges have taken part.

We estimated the number of students that are likely to have benefited from the programme based on an estimation of the number of students that each teacher is likely to teach. This is estimated to be on average 120 pupils per teacher. Based on this assumption we estimated that about 7,680 young people would have benefited from the training received.

## Who are the participants?

Over half of the participating schools (61%) were secondary schools, and under a quarter post-16 and higher education institutions (Table 89). No primary schools were presented here, as this was not who the resources were targeted at.

**Table 89: Participating schools by phase of education**

| School Phase | Number of schools | Percentage | National (%) |
|---|---|---|---|
| Primary | 0 | 0 | 68.9 |
| Secondary | 39 | 61% | 12.9 |
| All Through | 10 | 16% | 1.6 |
| 16 Plus (includes FE/HE) | 15 | 23% | 16.1 |
| **Total** | 64 | 100% | |

Over a third of the schools involved were academies and other autonomous schools (Figure 31). Higher education institutions and independent schools made up another third. Compared with the national figure, academies and independent schools were overrepresented. There were six teachers/instructors from the other devolved administrations, two each from Scotland, Wales and N Ireland.

**Figure 31: Types of school**

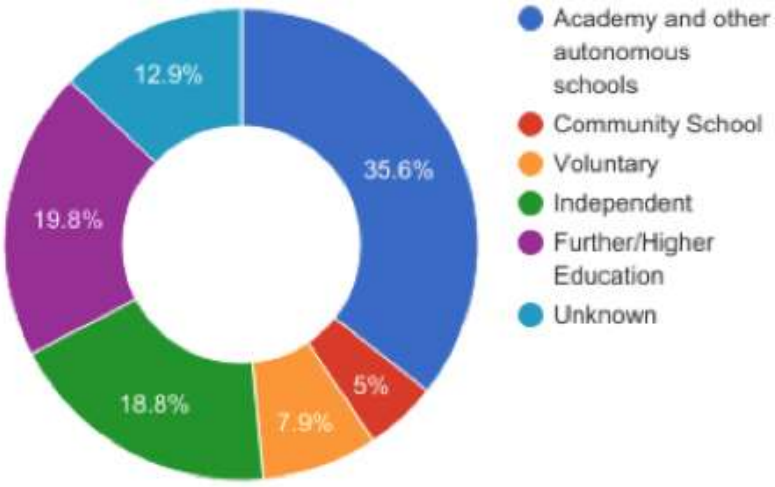


**Table 90: Participating schools by establishment type**

| Establishment Type | Number | Percentage | National (%) |
|---|---|---|---|
| Academy and other autonomous schools | 23 | 36% | 24.6 |
| Community School | 3 | 5% | 30.8 |
| Voluntary | 5 | 8% | 20.5 |
| Independent | 12 | 19% | 6.9 |
| *Further/Higher Education | 14 | 20% | 1.8 |
| **Unknown | 6 | 13% | |
| **Total** | 64 | 101% | |

*Includes one 6th form college.

**Unknown refers to schools in Wales, N Ireland and Scotland where the school classification is slightly different to that in England

As shown on Table 91 the schools that took part in the CPD sessions tended to be larger schools with lower levels of disadvantage compared to those in England as a whole. Since no primary schools were represented, comparison with the national schools was with secondary schools only.

**Table 91: Levels of disadvantage of participating schools**

| Indicators of disadvantage | Astro Academy Schools | National average (for secondary schools only) |
|---|---|---|
| %FSM | 12.8 | 13.2 |
| %EAL | 19.4 | 15.7 |
| %SEN | 1.6 | 3.0 |
| School size | 1070 | 939 |

## Where do participants come from?

Most of the participating schools for Astro Academy came from the London area. The other regions were fairly evenly spread out (see Figure 32 and Table 92).

**Figure 32: Geographical distribution of Astro Academy schools**

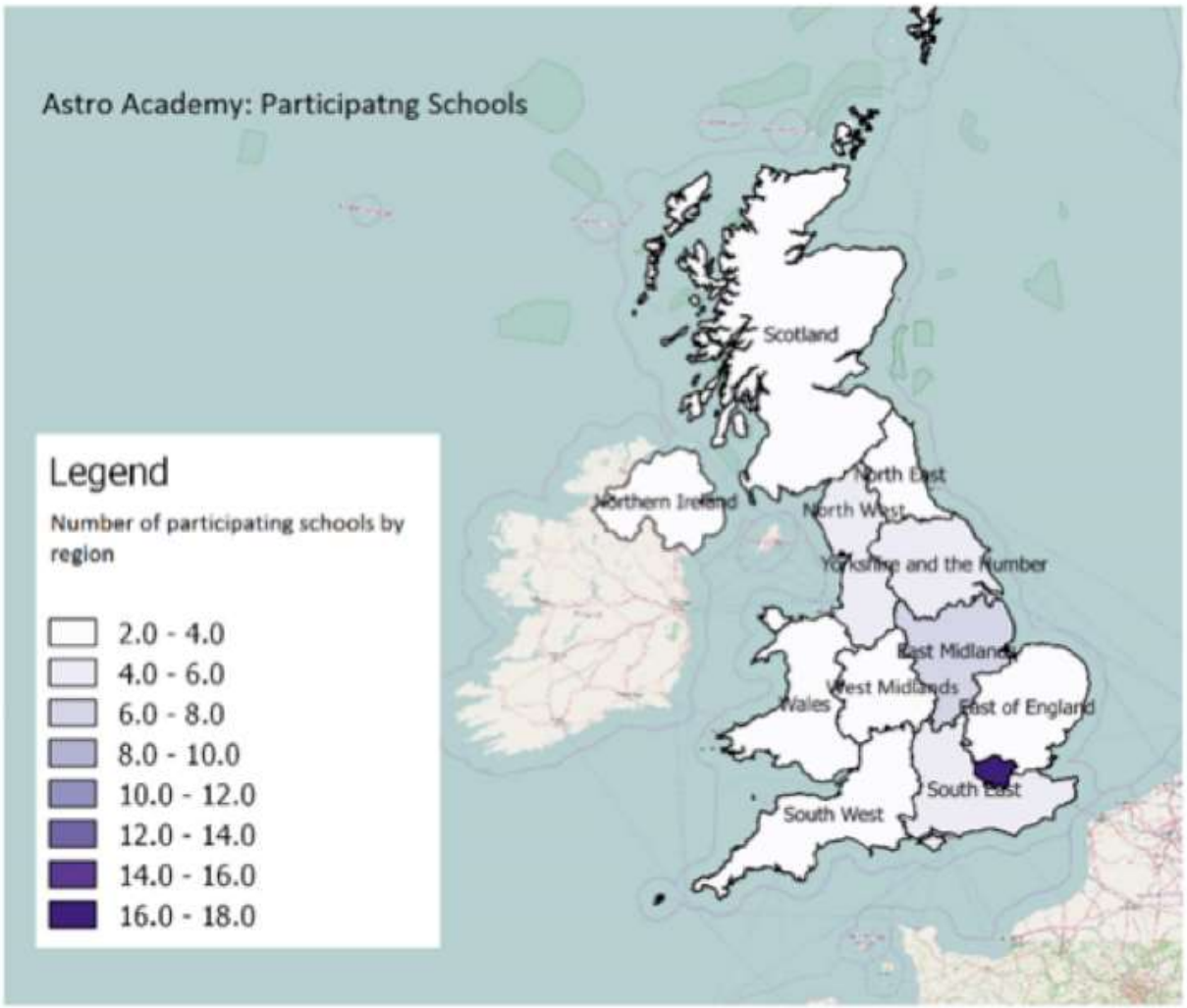
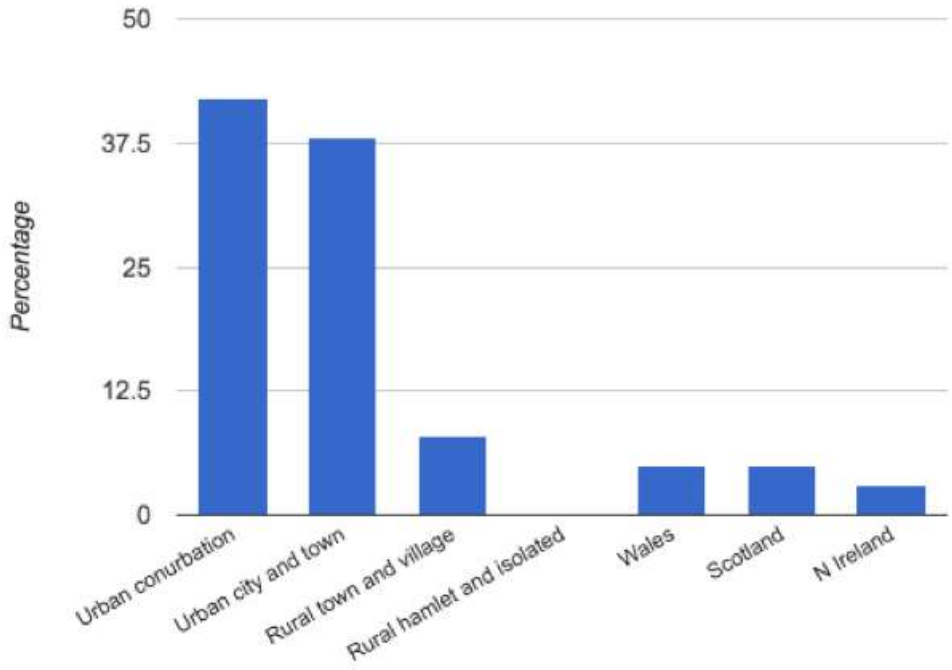


**Table 92: Geographical spread of Astro Academy schools**

| Geographical regions | No of schools | % |
|---|---|---|
| East Midlands | 8 | 13 |
| West Midlands | 4 | 6 |
| North East | 2 | 3 |
| North West | 6 | 9 |
| East of England | 3 | 5 |
| London | 18 | 28 |
| South East | 6 | 9 |
| South West | 3 | 5 |
| Yorkshire and the Humber | 6 | 9 |
| Wales | 3 | 5 |
| Scotland | 3 | 5 |
| N Ireland | 2 | 3 |
| **Total** | 64 | 100 |

It is clear from Figure 33 that the majority of teachers who attended these CPD sessions came from schools in the urban towns and cities. This is to be expected since these places are where most of the schools are located. However, compared to the national distribution, proportionately schools in the rural areas were underrepresented.

**Figure 33: Locality of participating schools**

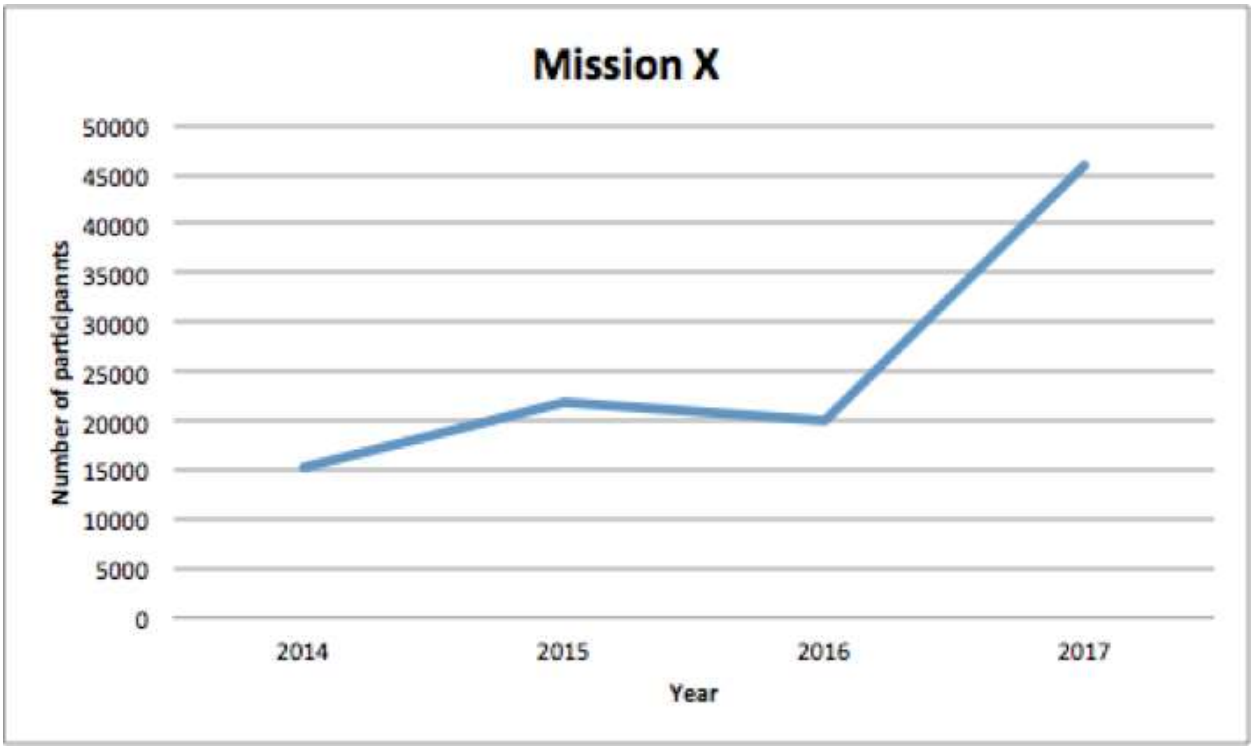



# MISSION X

Mission X is a programme developed by NASA and the European Space Agency scientists and fitness professionals to inspire students to learn about the science of nutrition and exercise as well as to increase their activity levels. The programme is open to schools around the world. Mission X has been running for 4 years now, starting in 2014. It takes place between January and March each year and schools which registered for the challenge were offered a range of space outreach activities.

In the four years since the programme started (from 2014 to 2017) a total of 102,945 young people have been involved in this programme. The majority of these came from the 804 schools that registered. There were also registrations from other organisations like the Scouts group, home educators and individuals. Figure 34 shows a hike in activity in 2017. The likely reason for this would be Tim's mission into space and his return in June 2016. This had generated a lot interest in the programme because of the media attention at that time.

**Figure 34: Number of participants from 2014 to 2017**




There are a number of schools for which we have no information. These include schools that are based overseas, schools with no postcodes and schools whose postcodes were incorrect. It is not possible to locate schools with common names, such as St Mary's and St Thomas with no postcodes. Some special schools are not listed on the DfE Edubase data. These are listed here as unknowns.

## Who are the participants?

Almost all the registrations came from schools. Under 10% were from clubs, youth groups, home educators and individuals as well as the general public (Table 93). There were also schools that registered through ESERO-UK and STEM learning centres, but we do not have the names of the schools. We record these as registrations not via schools.

**Table 93: Types of registrations**

| | **Registrations** | | **Participants** | |
|---|---|---|---|---|
| Schools | 804 | 91% | 93015 | 90.4% |
| Registrations not via schools | 80 | 9% | 9540 | 9.3% |
| Unknown | 4 | 0% | 390 | 0.4% |
| **Total** | 888 | 100% | 102945 | 100% |

The majority of schools involved in Mission X activities were primary schools. These accounted for almost 90% of the participants, suggesting that Mission X tended to attract younger punters (Table 94).

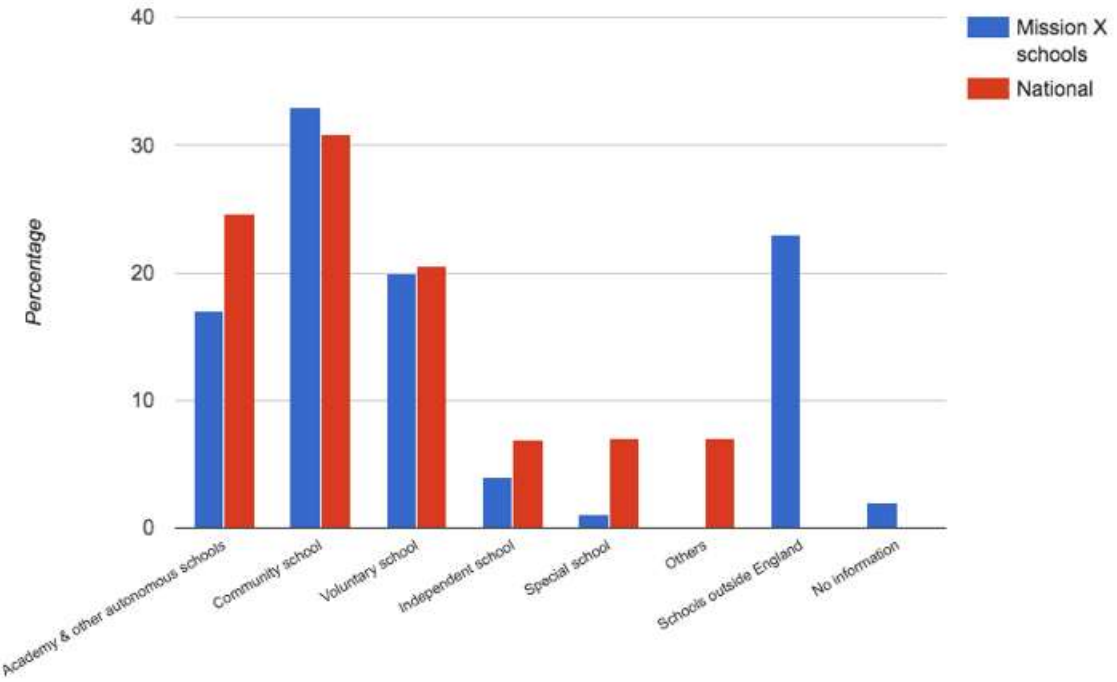
**Table 94: Participants by phase of education**

| **School phase** | **Number of schools** | | **Participants** | |
|---|---|---|---|---|
| Primary | 707 | 88% | 78100 | 84% |
| Secondary | 60 | 7% | 9,169 | 10% |
| Sixth form | 1 | 0% | 60 | 0% |
| All Through | 32 | 4% | 4,618 | 5% |
| *Unknown | 4 | 0% | 1,068 | 1% |
| **Total** | 804 | 100% | 93,015 | 100 |

*Includes one English school in Kuwait

Proportionally, there were more Community schools and Academies and other autonomous schools registered for Mission X activities. This largely reflects the types of schools in England (Figure 35).

**Figure 35: Types of schools in Mission X project**




The kinds of schools involved in Mission X activities have slightly higher levels of disadvantage than the average schools in England (Table 95).

**Table 95: Levels of disadvantage of Mission X schools**

| Indicators of disadvantage | Mission X schools (%) | National average (%) |
|---|---|---|
| %FSM | 14.8 | 13.3 |
| %EAL | 14.3 | 13.0 |
| School size | 362 | 350 |

## Where do participants come from?

Most of the schools and participants that took part in the Mission X activities came from Scotland (Figure 36 and Table 96). It is interesting to note that there were three schools outside UK. One was in Poland, one in Bangkok and one in Kuwait.

**Figure 36: Geographical distribution of Mission X schools**

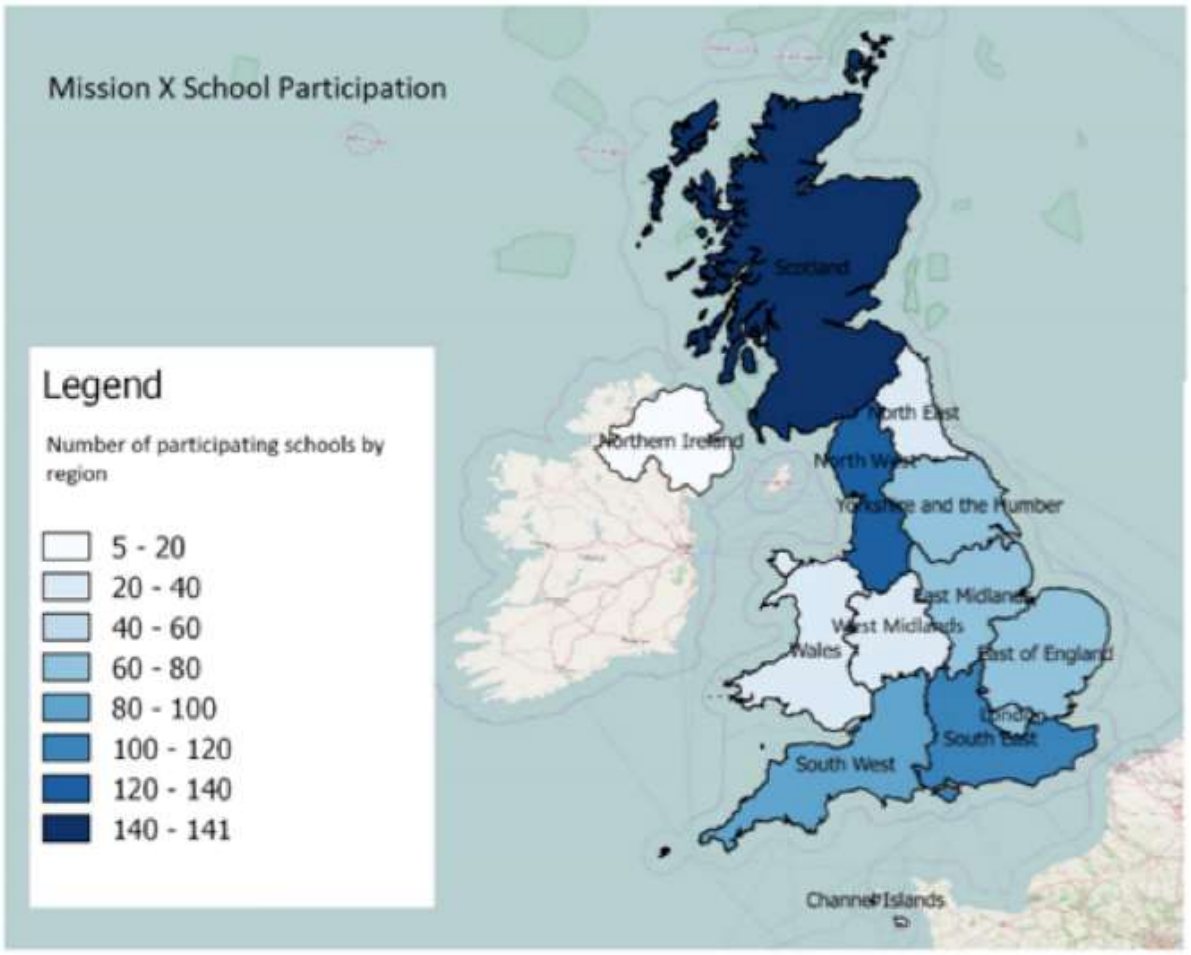
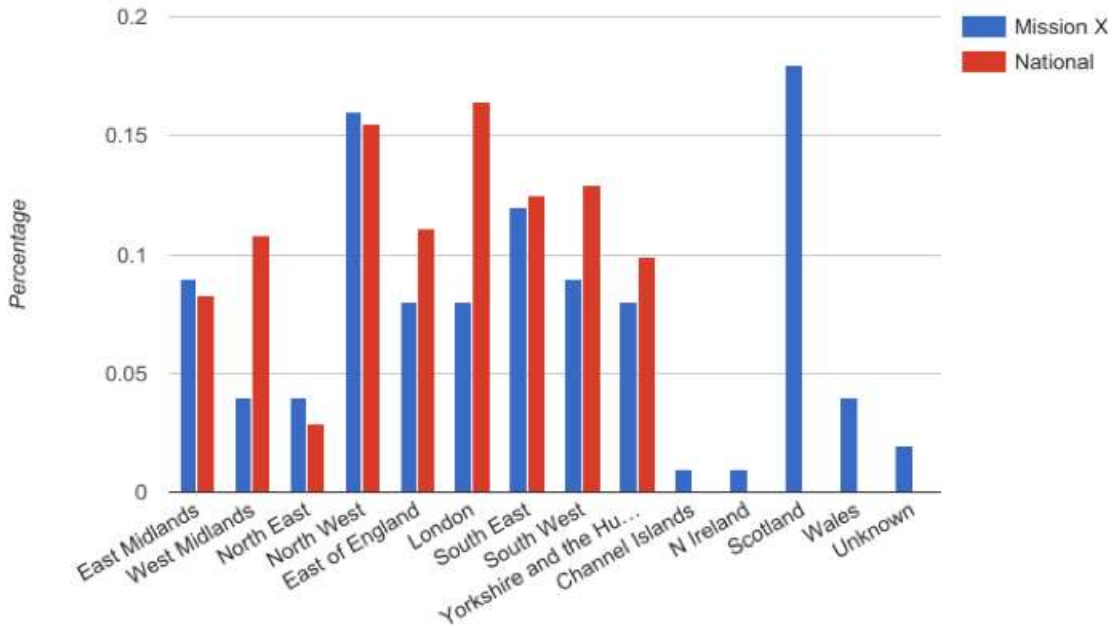


**Table 96: X participating schools from outside England**

| | Number of schools | Number of participants |
|---|---|---|
| Guernsey and Jersey | 5 | 539 |
| Scotland | 140 | 12,189 |
| Wales | 28 | 2088 |
| N Ireland | 5 | 445 |
| Outside UK | 3 | 1117 |
| **Total** | 181 | 16,378 |

Compared to the national distribution of schools there were proportionately more schools from Scotland, North West and the South East. Schools in the North West were overrepresented. Schools in London and the West Midlands, on the other hand, were underrepresented. Generally, the schools involved in Mission X are fairly representative of the national spread (Figure 37).

**Figure 37: Distribution of Mission X schools compared to the national distribution**



Overall, the highest number of participants came from the South East (Table 97). This is followed by the North West (14%) and Scotland (12%).

**Table 97: Geographical distribution of all Mission X registrations**

| **Geographical regions** | **Number of establishments that registered** | | **Number of participants** | |
|---|---|---|---|---|
| East Midlands | 78 | 9% | 10178 | 10% |
| West Midlands | 30 | 3% | 3024 | 3% |
| North East | 31 | 3% | 4633 | 5% |
| North West | 133 | 15% | 14517 | 14% |
| East of England | 71 | 8% | 7924 | 8% |
| London | 74 | 8% | 8640 | 8% |
| South East | 109 | 12% | 17373 | 17% |
| South West | 81 | 9% | 9219 | 9% |
| Yorkshire and the Humber | 71 | 8% | 7997 | 8% |
| Channel Islands | 5 | 1% | 539 | 1% |
| N Ireland | 6 | 1% | 469 | 0% |
| Scotland | 141 | 16% | 12250 | 12% |
| Wales | 31 | 3% | 2380 | 2% |
| Outside UK | 3 | 0% | 1117 | 1% |
| Unknown | 26 | 3% | 2685 | 3% |
| **Total** | 890 | 100% | 102,945 | 100% |

Table 98 shows that the majority of the schools that took part in the Mission X project came from the urban areas, and are representative of the general distribution of schools in England and Wales. Note that the table includes only those schools in England, Cardiff and some offshore islands. Seventeen schools could not be located due to incorrect postcodes and incomplete school name.

**Table 98: Locality of Mission X schools**

| Types of locality | Number of schools | % | National (%) |
|---|---|---|---|
| Urban conurbation | 212 | 33% | 32.6 |
| Urban city and town | 258 | 41% | 40.9 |
| Rural town and village | 126 | 20% | 20.6 |
| Rural hamlet and isolated | 31 | 5% | 5.1 |
| *Others | 6 | 1% | 0.7 |
| **Total** | 633 | 100% | 100 |

* Others – includes one school in Jersey, 5 in Guernsey

The kinds of schools involved in Mission X activities are very similar to those of the national average, but with slightly higher levels of disadvantage than the average schools in England.

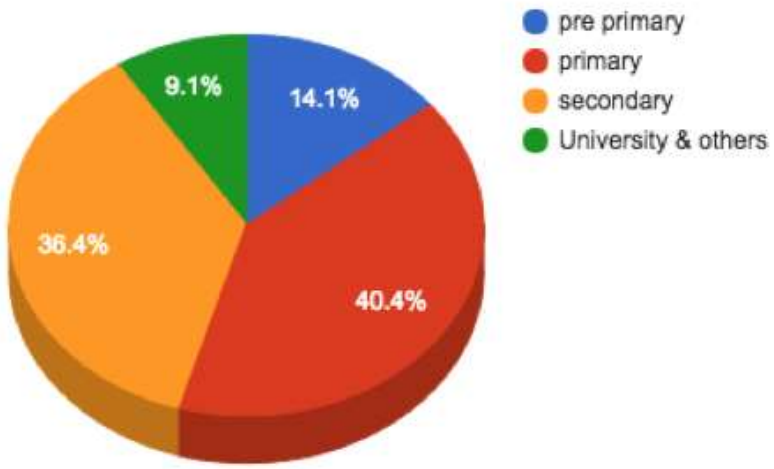
# ARISS

ARISS (Amateur Radio on the International Space Station) developed a competition together with the UK Space Agency to enable schools to speak to Tim directly during his stay in space using the amateur radio VHF and UHF radio equipment which was specially installed in schools for the week leading up to the call with Tim. A competition was run to select 10 schools that would host ARISS contacts with Tim Peake while he was on board the ISS. This took place between January and May 2016 and students were able to field questions to Tim using ARISS during a 10 minute contact.

The selected schools were required to demonstrate their commitment to space, communications and STEM (Science, Technology, Engineering and Mathematics) subjects during the school year 2015/2016 by seeking opportunities and extra-curricular activities for their students. In addition, they had to demonstrate outreach commitment to other local/regional schools and educational institutions so that as many students as possible could be involved in the Principia Mission.

## Who are the participants?

**Figure 38: School phase of participants**




A total of 44,145 young people were involved in this project. Over three-quarters of these were from primary and secondary schools. It is interesting to note that a substantial number of very young children under 4 also got to be involved with the Tim Peake contact via ARISS.

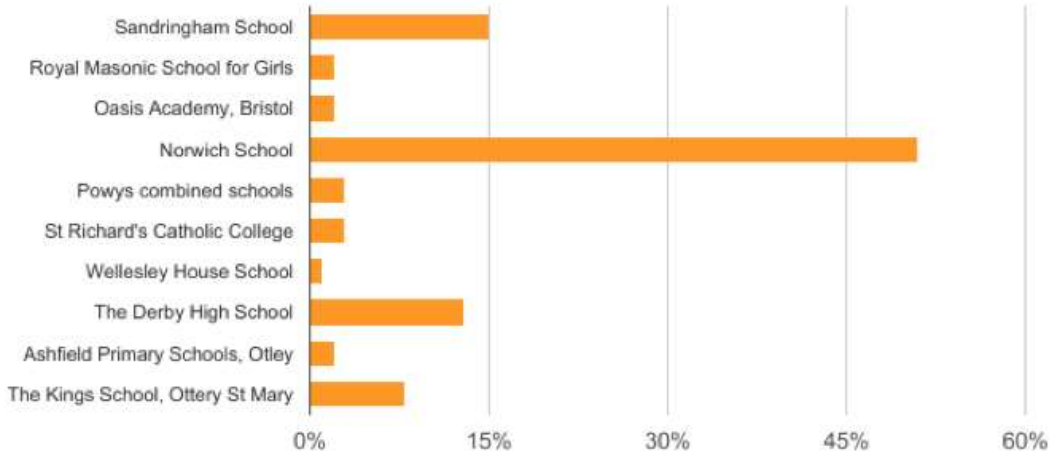
**Table 99: ARISS participants by phase of education**

| **Hosting school** | **Pre-school** (under 4) | **Primary** (4-11) | **Secondary** (11-18) | **Others** (University students and guests) | **Total** |
|---|---|---|---|---|---|
| Sandringham School, St Albans | 1462 | 1982 | 924 | 2332 | **6700** |
| Royal Masonic School for Girls, Rickmansworth | 45 | 187 | 373 | 240 | **845** |
| Oasis Academy Brightstowe, Bristol | 90 | 188 | 612 | 178 | **1068** |
| Norwich School, Norwich | 3294 | 9291 | 9961 | 53 | **22599** |
| Powys combined schools, Powys | 26 | 750 | 545 | 170 | **1491** |
| St Richard's Catholic College, Bexhill-on-Sea | 166 | 257 | 669 | 107 | **1199** |
| Wellesley House School, Broadstairs. | 59 | 215 | 19 | 126 | **419** |
| The Derby High School, Bury | 208 | 3247 | 2168 | 26 | **5649** |
| Ashfield Primary Schools, Otley | 70 | 382 | 159 | 165 | **776** |
| The Kings School, Ottery St Mary | 825 | 1208 | 648 | 718 | **3399** |
| **Total** | 6,245 | 17,707 | 16,078 | 4,115 | 44,145 |

Each of the ten schools had only one contact with Tim – a 10 minute radio call, during which 10 students got to ask their question to Tim. The participants included students within that school and neighbouring schools that were invited to hear the contact or be involved in the STEM activities. Not all the participants got to speak to Tim themselves.

Of the ten schools, the two schools in the East of England (City of Norwich and Sandringham school) generated the most activities. Fifty percent of the participants who were involved in the contact with Tim came from City of Norwich School. The Derby School in the North West contributed 13% of the participants involved.

**Figure 39: Percentage of contacts from each hosting school**



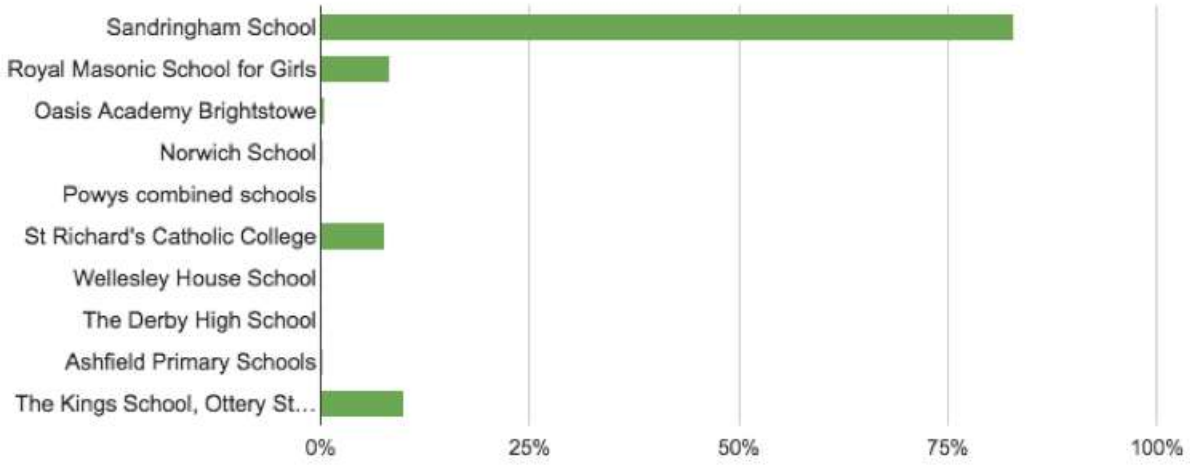

In addition, young people also interacted with indirectly with Tim via social media. A huge amount of online activity was generated via ARISS. This included 8,200 live web stream sessions and 485,253 social media posts and tweets concerning the ARISS contacts

**Table 100: Social media interactions made from each hosting school**

| **Hosting school** | **ARISS**<br>Web stream sessions | **Social media**<br>Notable posts, reach and tweets | **Total** |
|---|---|---|---|
| Sandringham School, St Albans | 1,300 | 408,253 | 409,553 |
| Royal Masonic School for Girls, Rickmansworth | 960 | 40,000 | 40,960 |
| Oasis Academy Brightstowe, Bristol | 1,860 | | 1,860 |
| Norwich School, Norwich | 1,050 | | 1,050 |
| Powys combined schools, Powys | 330 | | 330 |
| St Richard's Catholic College, Bexhill-on-Sea | 700 | 37,000 | 37,700 |
| Wellesley House School, Broadstairs. | 350 | | 350 |
| The Derby High School, Bury | 300 | | 300 |
| Ashfield Primary Schools, Otley | 750 | | 750 |
| The Kings School, Ottery St Mary | 600 | | 600 |
| **Total** | 8,200 | 485,253 | 493,453 |

As shown in Figure 40, almost all (83%) the online interactions were generated from Sandringham School alone. This was most likely due to the fact it was the first ARISS contact made with Tim at the beginning of his mission, so the novelty attracted a lot of media attention.

**Figure 40: Percentage of online interactions from each hosting school**




## Characteristics of the 10 ARISS schools

As can be seen from Table 101, 60% of the ARISS schools are secondary academies. Almost all are mixed schools with both boys and girls. There is one all girls school. In terms of levels of disadvantage these schools are above national average for secondary schools in England on two key indicators (14.1% FSM vs 13.3% for the national average; 8.5% SEN with support vs 3.0% for the national average).

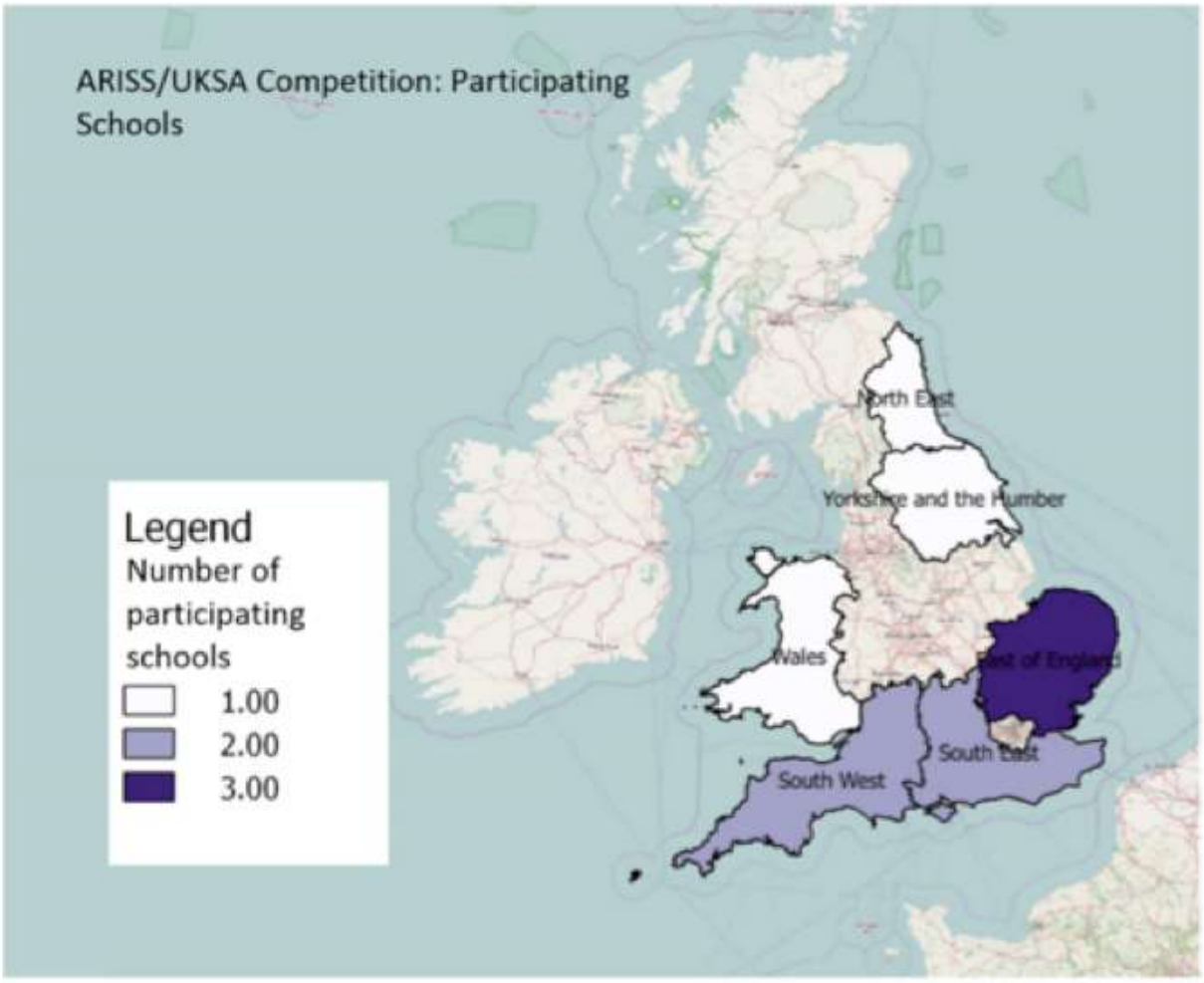
These schools are also high performing schools with above average to average figures in terms of progress made. They are all good schools with 'good' to 'outstanding' Ofsted ratings. They are also likely to be in more affluent parts of the country such as the South East and East of England. No schools from the Midlands and the North East were represented.

**Table 101: Characteristics of ARISS hosting schools**

| **Types of establishment** | **Academy** | **Community** | **Independent** | **Voluntary** | **Unknown** | **Others** |
|---|---|---|---|---|---|---|
| | 6 | 2 | 1 | 1 | 1 | |
| **Phase of education** | **Primary** | **Secondary** | **All through** | **Unknown** | | |
| | 1 | 6 | 2 | 1 | | |
| **Gender mix** | **Mixed** | **Boys** | **Girls** | **Unknown** | | |
| | 8 | 0 | 1 | 1 | | |
| **Disadvantage (average)** | **%FSM** | **%EAL** | **%SEN** | **Size of school** | | |
| | 14.1 | 10.9 | 8.5 | 875 | | |
| **Academic performance** | **Above average** | **Average** | **Not available** | | | |
| | 5 | 3 | 2 | | | |
| **Ofsted rating** | **Outstanding** | **Good** | **Not available** | | | |
| | 3 | 4 | 3 | | | |
| **Geographical locations** | East of England | South East | South West | North West | Yorkshire and the Humber | Wales |
| | 3 | 2 | 2 | 1 | 1 | 1 |
| **Types of locality** | Urban conurbation | Urban towns and cities | Rural town and village | Unknown | | |
| | 3 | 5 | 1 | 1 | | |

It is very clear from the map that most of the participating schools were concentrated in the East of England and the Southern coastal belt. This is because certain technical restrictions due to the position of the ISS meant that only certain locations could host an ARISS call. Although it was aimed to be inclusive, Scottish schools could not take part for practical reasons.

**Figure 41: Geographical distribution of ARISS hosting schools**



# TIM PEAKE PRIMARY PROJECT (TPPP)

The Tim Peake Primary Project (TPPP) encouraged primary school children to engage with science, literacy and numeracy using the Space theme. This project was run by ESERO-UK (the UK's Space Education Office). The aims were to increase enjoyment and engagement in science, raise young children's confidence in learning science and provide information about career opportunities in science and maths subjects. It also aimed to support teachers' teaching of Space topics.

The project was supported by the ESERO-UK network of space ambassadors who helped schools take part in a range of space activities specially created to support Tim's mission to the ISS. These activities also included professional development for teachers that were delivered either locally or via INSET training in the schools.

The Space Ambassadors were a group of experienced educators with a passion for space and included both space experts and those from teaching background. All activities run by the space ambassadors were free for schools.

In association with this project is the Tim Peake School Grant Scheme where schools could bid for up to £6,000 for projects that sought to extend the experience of the Principia mission to ensure that the impact of the mission was continued into the future both for schools, teachers, schools and the wider communities. Three rounds of grant schemes were offered under this project.

## The statistics

The overall picture is that 1,257 schools and under 119,000 young people were involved in the ESERO-UK's Tim Peake Primary project.

In the first year of the programme, a total of 631 schools were involved, and another 626 participated in the final year. Sixty-four schools received the TP Schools Grants (27 in the first round, 25 in the second and 12 in the third round). These were mostly the same schools.

A handful of schools that took part in the first year continued in the second year, sometimes as part of teacher professional development programme. Almost all the schools that signed up for the programme also received grants under the TP Schools grant schemes. To avoid double counting of schools we removed these schools. This left us with 1,257 schools.

We do not know exactly how many pupils were involved, but anecdotal evidence from the Space Ambassadors suggests that the programme had, in some schools, generated whole-school activities. Some schools also sent more than one teacher to the CPD session. So we can assume that the reach of the programme would be the whole school in some schools. So on average we estimated that the number of pupils who have benefited from this programme would be 100 (or the size of the school, if smaller). Based on this assumption, it is estimated that about 119,000 students participated in ESERO-UK's Tim Peake Primary project. There were no data for 116 schools. These were schools that cannot be found due to having no address and/or postcode or incorrect postcodes, or newly established schools for which no data was available.

## Who are the participants?

The Tim Peake Primary Project was aimed at primary school children, so it is not surprising that almost all the schools involved were primary schools (Table 102). It is interesting that there were 21 secondary schools too. 'All Through' schools are usually large schools or independent schools with primary and secondary intakes.

**Table 102: Participants by types of school**

| **School Phase** | **Establishments** | | **Participants** | |
|---|---|---|---|---|
| Primary | 1167 | 93.3% | 110828 | 93.5% |
| Secondary | 21 | 1.7% | 2008 | 1.7% |
| All Through | 62 | 5% | 5635 | 4.8% |
| **Total** | 1250 | 100% | 118471 | 100% |

Note: There are 7 entries which are unknown and have no participants listed, therefore are not included in the table above)

In terms of the kind of schools, TPPP attracted a good spread of pupils from the different types of educational establishments (Table 103). They are fairly representative of the kind of schools in England and Wales. In addition, the project has also successfully attracted young people from other parts of the UK (e.g. Scotland, Wales and N Ireland). Almost all the schools (145/150) from Scotland and Wales were state schools.

**Table 103: Participants by school type**

| School type | Number of schools | | National (%) | Number of Participants | |
|---|---|---|---|---|---|
| Academy and other autonomous schools | 251 | 20.08% | 24.6% | 24658 | 20.8% |
| Community School | 476 | 38.08% | 30.8% | 46313 | 39.2% |
| Independent School | 62 | 4.96% | 6.9% | 5690 | 4.8% |
| Voluntary School | 294 | 23.52% | 20.5% | 27486 | 23.2% |
| Special schools | 16 | 1.28% | 7% | 1121 | 1% |
| Ministry of Defence | 1 | 0.08% | - | Na | 0% |
| Others (N Ireland, Scotland, Wales and the Channel Islands | 150 | 12% | 7% | 13022 | 11% |
| **Total** | 1250 | 100% | 100% | 118290 | 100% |

Compared to the national average, schools taking part in the Tim Peake Primary Project are fairly similar to the national average although the figure for EAL is somewhat below the national primary-age average (Table 104).

**Table 104: Levels of disadvantage of TPPP schools**

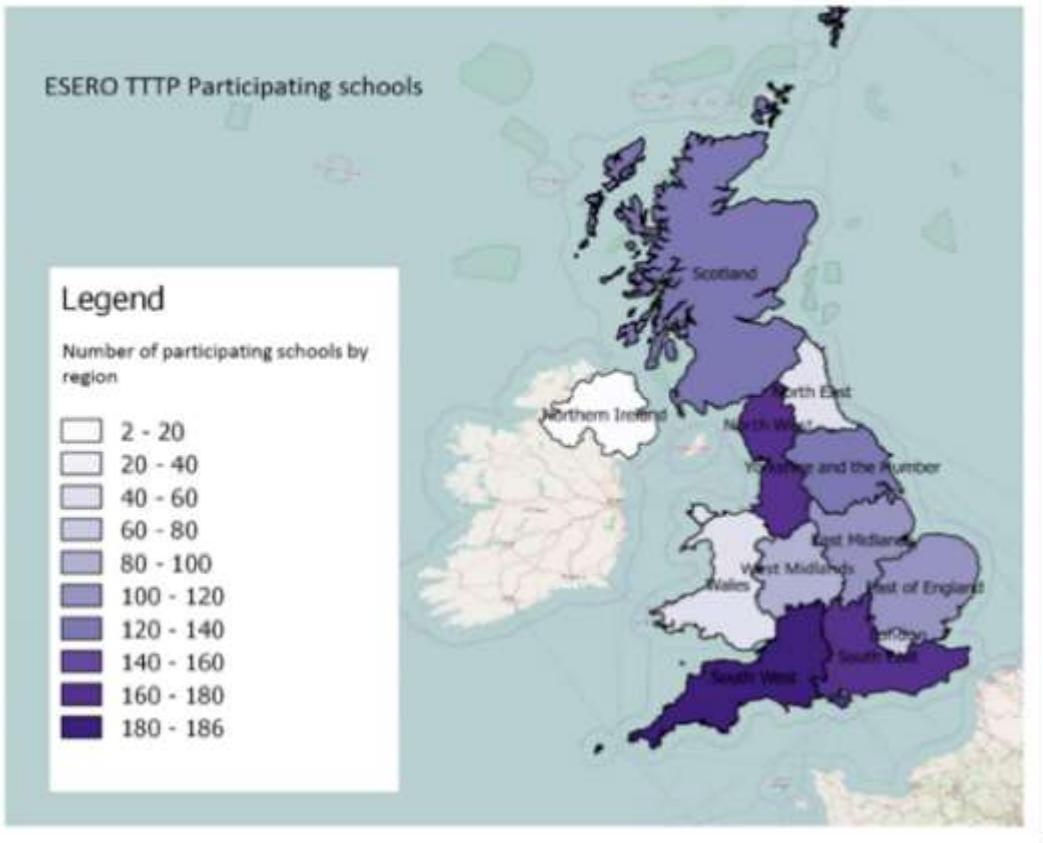
| Indicators of disadvantage | TPPP Establishments | National average (for primary school) |
|---|---|---|
| %FSM | 13.95 | 14.5 |
| %EAL | 11.25 | 20.1 |
| School size | 294 | 260 |

Note: since most of the schools in this project were primary schools we compare the figures with the national figures for primary schools

## Where do participants come from?

As can be seen on the map (Figure 42), schools taking part in the Tim Peake Primary Project tended to be from the South West, South East and the North West.

**Figure 42: Geographical distribution of TPPP schools**




Compared to the national distribution of schools, London appears to be underrepresented while schools in the South West are overrepresented (Table 105). As with most of the other projects, proportionately there were more schools from the South East and the North West taking part in TPPP. This is not surprising as the there are more schools in these regions.

**Table 105: Geographical distribution of TPPP schools**

| Geographical regions | Number of establishments that registered | | National (%) | Number of participants | |
|---|---|---|---|---|---|
| East Midlands | 110 | 8.8% | 8.5 | 10297 | 8.7% |
| West Midlands | 96 | 7.6% | 10.1 | 9411 | 7.9% |
| North East | 46 | 3.7% | 4.5 | 4518 | 3.8% |
| North West | 169 | 13.4% | 13.3 | 16482 | 13.9% |
| East of England | 104 | 8.3% | 10.7 | 9822 | 8.3% |
| London | 69 | 5.5% | 12.1 | 6835 | 5.8% |
| South East | 171 | 13.6% | 15.9 | 16559 | 14% |
| South West | 186 | 14.8 | 8.9 | 17326 | 14.6% |
| Yorkshire and the Humber | 125 | 10% | 9.2 | 11943 | 10% |
| N Ireland | 2 | 0.2% | | 100 | 0.1% |
| Scotland | 129 | 10.2% | | 10811 | 9.3% |
| Wales | 46 | 3.7% | 6.2 | 4167 | 3.5% |
| *Outside UK | 2 | 0.2% | | 100 | 0.1% |
| Others | | | 0.6 | | |
| **Total** | 1255 | 100% | 100 | 118471 | 100% |

Note: There are 5 more establishments in this table compared to the previous two tables. These include one establishment that cannot be found and other non-school establishments. Two entries were unknown with no participants listed so are not included in the above table.

*Schools outside UK include one from Cyprus and one from Amsterdam.

The locality where the schools came from is fairly similar to the national spread (Table 106). This suggests that TPPP has successfully reached out to schools in all parts of England, including those in the rural areas.

**Table 106: Locality of TPPP hosting schools**

| Types of locality | Number | % | National (%) |
|---|---|---|---|
| Urban conurbation | 288 | 22.9 | 32.6 |
| City and town | 485 | 38.6 | 40.9 |
| Rural town and village | 254 | 20.2 | 20.6 |
| Rural hamlet and isolated | 64 | 5.1 | 5.1 |
| Unknown | 166 | 13.2 | |
| Others | | | 0.7 |
| **Total** | 1257 | 100% | 100 |

Note: 'Unknown' includes 131 recorded as 'Scotland' and 18 recorded as 'Wales'. We do not have the locality classification of schools in these regions.

# TIMPIX

TimPix was a project that offered schools the unique opportunity to carry out their own research using radiation data from Timpix detectors (based on technology from CERN) on board the International Space Station. These detectors monitored the type of radiation Astronauts and Cosmonauts come into contact with whilst in orbit. The radiation comes from the sun and other sources outside our Solar System.

TimPix is part of the new Institute for Research in Schools (IRS) – a national charity supporting sixth form students in performing original academic research. TimPix also offered CPD sessions at the National Space Academy. Forty-five teachers signed up for the CPD sessions via IRS , but altogether 170 teachers had received the CPD training; we do not have the names of these schools as some of the events were organized by other organisations.

A total of 91 schools signed up for the TimPix research programme involving 1233 young people across the UK, including 18 schools in Scotland, three in Wales and one from N Ireland. Fifteen schools did not have data on the number of participants. These included 11 secondaries, two all-through schools, one voluntary and one primary school. They were schools that signed up for another project but added TimPix as one of their activities later.

## Who are the participants?

Figure 43 shows that the majority of the participants in the TimPix project were secondary school pupils. Of the 91 schools, the majority were secondary schools with three post-16 institutions (two sixth form colleges and one FE college). Only one primary school was represented. This looked like a school Physics club. The number of participants from this school is not known.

**Figure 43: Participants by phase of education**

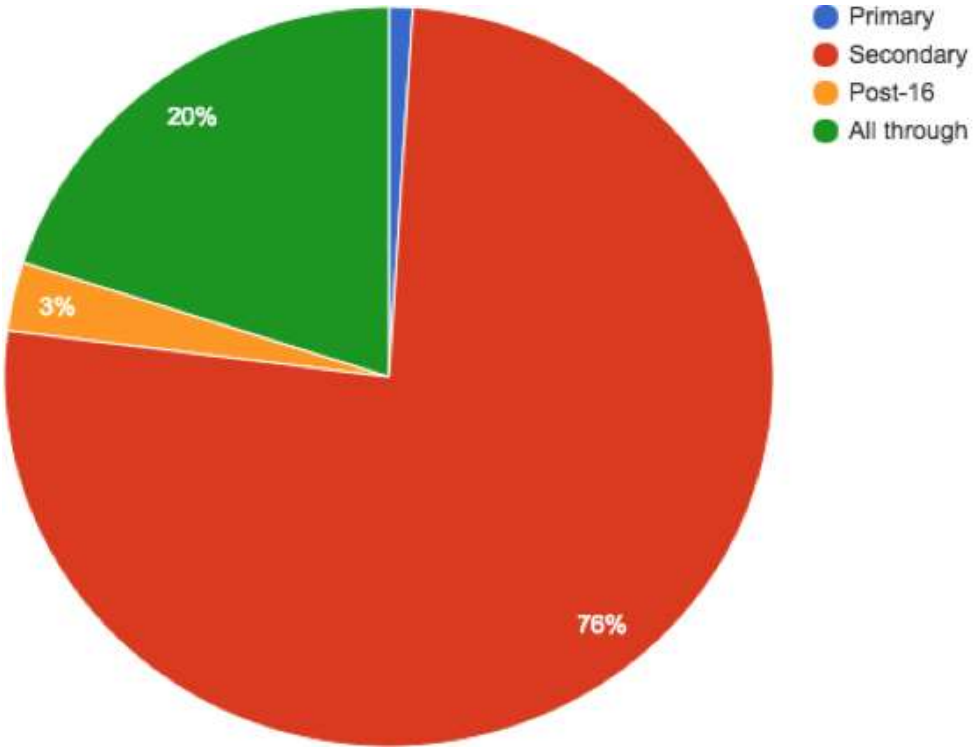


**Table 107: Participants by phase of education**

| School phase | Number of Schools | % | Number of Pupils | % |
|---|---|---|---|---|
| Primary | 1 | 1 | 0 | - |
| Secondary | 69 | 76 | 951 | 77 |
| Post-16 | 3 | 3 | 41 | 3 |
| All through | 18 | 20 | 241 | 20 |
| **Total** | 91 | 100 | 1233 | 100 |

Half of the schools that took part in the TimPix research programme were Academies and other autonomous schools (Figure 44). Schools from the other devolved administrations, namely Scotland and Wales formed 20% of all the schools that participated (Figure 44).

The nature of the programme meant that it was more suitable for older pupils, hence primary schools were not represented (apart from one that participated as part of a physics club project).

**Figure 44: Participants by types of school**

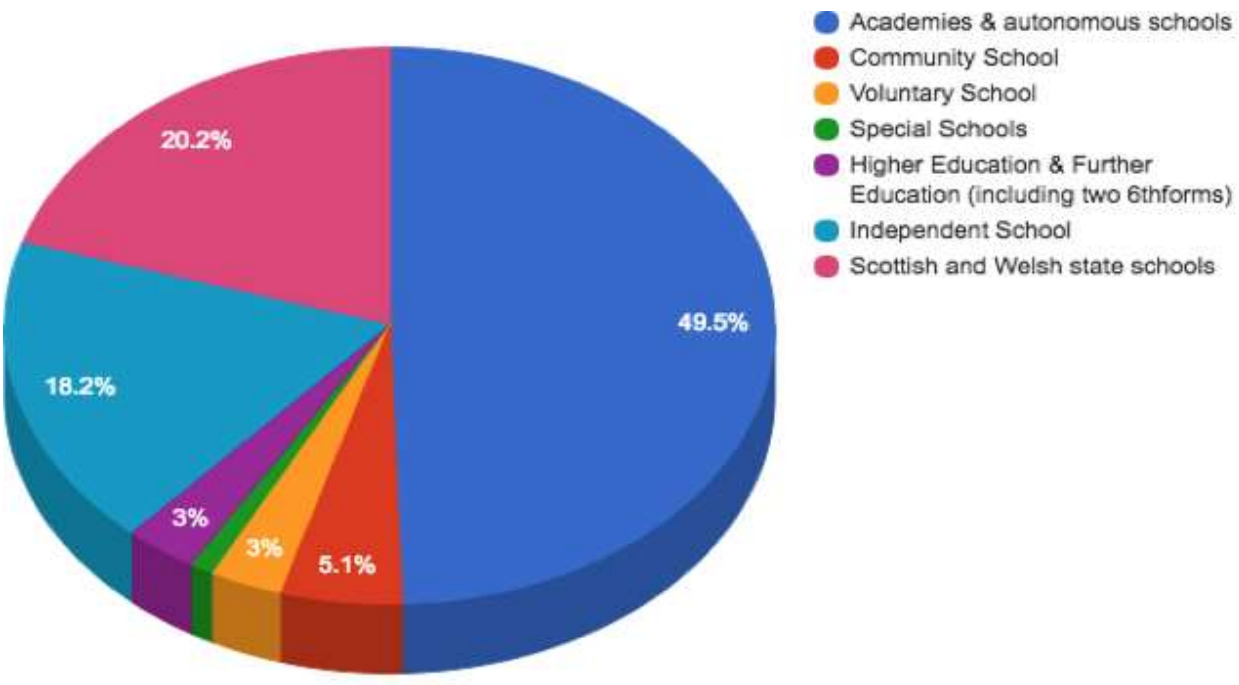



**Table 108: Participants by types of school**

| **Types of establishments** | **Number of schools** | **%** | **Number of pupils** | **%** |
|---|---|---|---|---|
| Academies and autonomous schools | 45 | 49 | 592 | 48 |
| Community School | 5 | 5 | 39 | 3 |
| Voluntary School | 3 | 3 | 18 | 1 |
| Special Schools | 1 | 1 | 10 | 1 |
| Higher Education and Further Education (including one 6th form) | 3 | 3 | 35 | 3 |
| Independent School | 16 | 18 | 257 | 21 |
| Scottish and Welsh state schools | 18 | 20 | 282 | 23 |
| **Total** | 91 | 100 | 1233 | 100 |

Schools that took part in the TimPix programme are less disadvantaged than the average for England. They are also, on average, bigger schools.

**Table 109: Levels of disadvantage of TimPix schools**

| Indicators of disadvantage | TimPix schools | National average for secondary schools in England |
|---|---|---|
| %FSM | 9.8 | 13.2 |
| %EAL | 11.1 | 15.7 |
| %SEN | 1.3 | 3.0 |
| School size | 1062 | 939 |

## Where do participants come from?

About 20% of the schools taking part in the TimPix research programme came from Scotland. Half of the schools came from the East of England, London, South East and South West together (Table 110). No schools in the North East were represented. This can be seen clearly from the map (Figure 45).

**Table 110: Geographical distribution of participants**

| **Geographical regions** | **Number of schools that registered** | | **Number of participants** | |
|---|---|---|---|---|
| East Midlands | 2 | 2% | 10 | 1% |
| West Midlands | 6 | 7% | 63 | 5% |
| North East | 0 | 0% | 0 | 0% |
| North West | 11 | 12% | 173 | 14% |
| East of England | 10 | 11% | 103 | 8% |
| London | 12 | 13% | 147 | 12% |
| South East | 12 | 13% | 199 | 16% |
| South West | 12 | 13% | 171 | 14% |
| Yorkshire and the Humber | 3 | 3% | 35 | 3% |
| N Ireland | 1 | 1% | - | |
| Scotland | 18 | 20% | 285 | 23% |
| Wales | 4 | 4% | 47 | 4% |
| **Total** | 91 | 100% | 1233 | 100% |

**Figure 45: Geographical distribution of TimPix school**

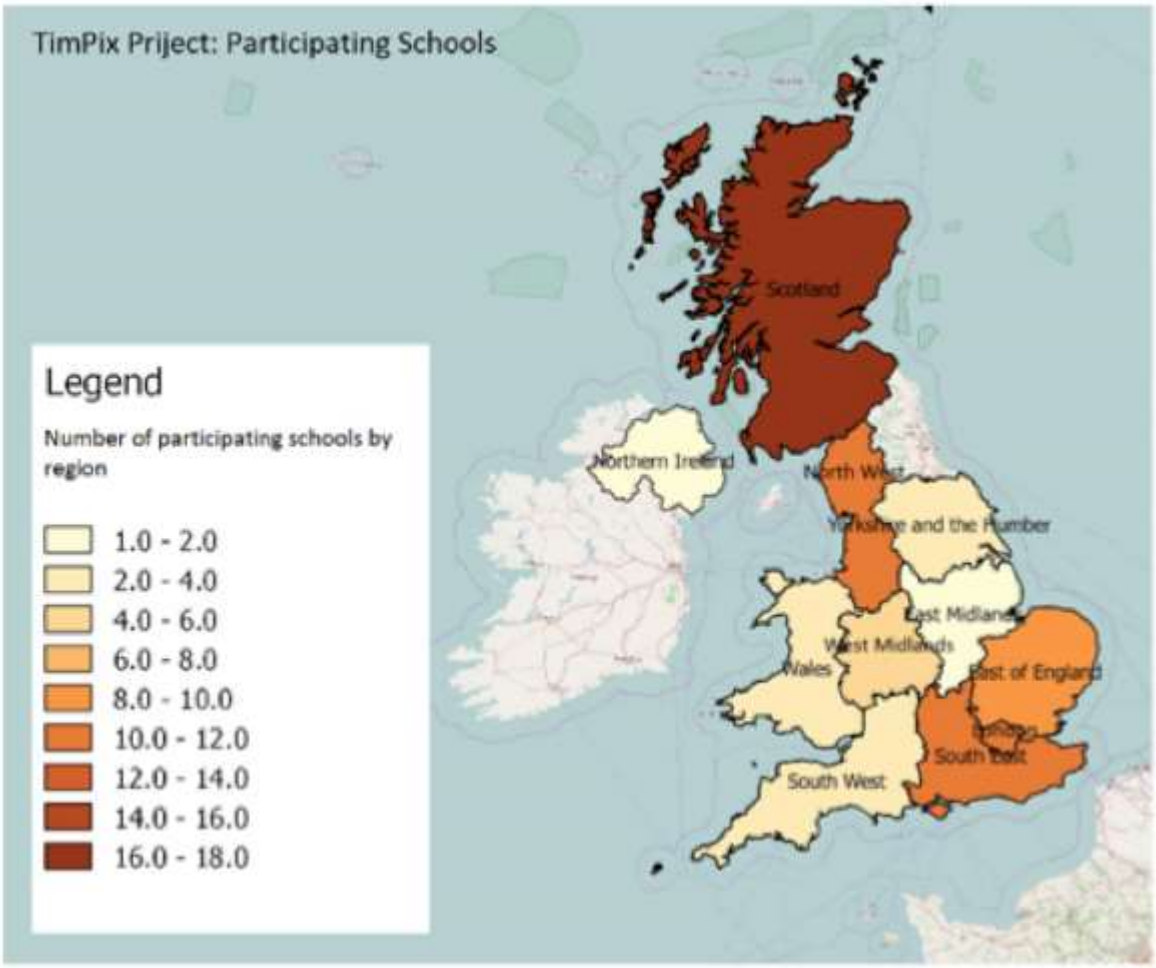
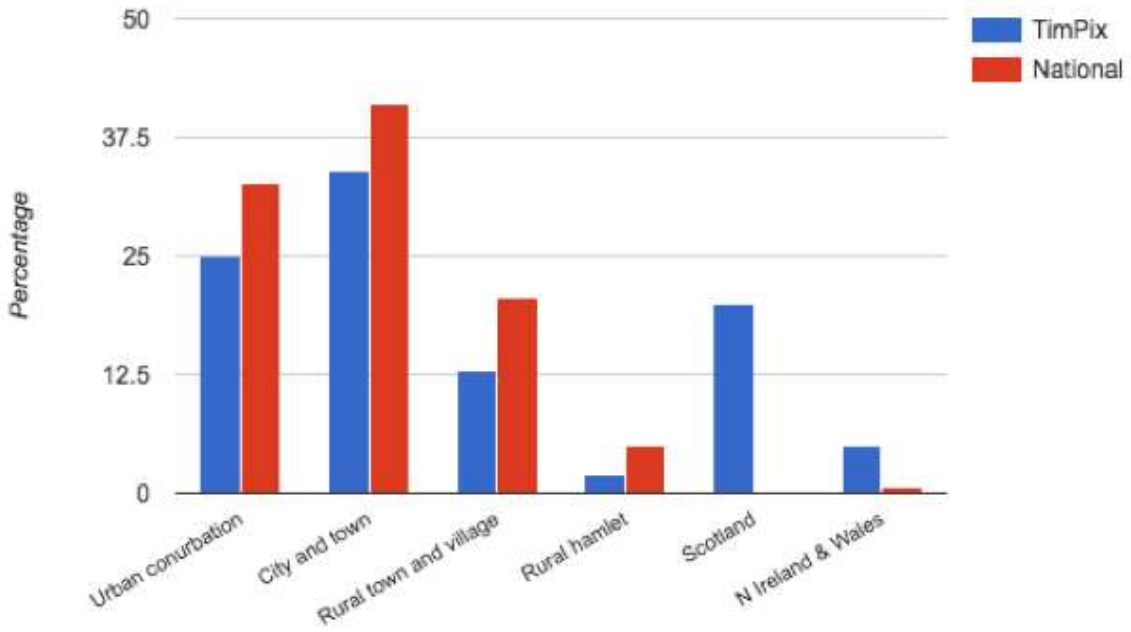


**Figure 46: Locality of TimPix schools**




Over 50% of the schools that took part in the TimPix research programme were in the urban areas. This is in line with the national distribution of schools (Table 111).

**Table 111: Locality of TimPix schools**

| **Types of locality** | **Number of schools** | **%** | **National (%)** |
|---|---|---|---|
| Urban conurbation | 23 | 25 | 32.6 |
| City and town | 31 | 34 | 40.9 |
| Rural town and village | 12 | 13 | 20.6 |
| Rural hamlet and isolated villages | 2 | 2 | 5.1 |
| Scotland | 18 | 20 | |
| N Ireland and Wales | 5 | 5 | 0.7 |
| **Total** | 91 | 100 | 100 |

# MISSION: STARLIGHT – ROYAL SOCIETY OF CHEMISTRY

Mission Starlight was a global science experiment introduced by Tim Peake and supported by a collaboration between the Royal Society of Chemistry and the UK and European Space Agencies. The purpose of the experiment was to investigate materials that block or limit UV light. Using affordable and widely available UV colour-changing beads, students were asked to test different materials for their ability to block UV light. The project includes a number of different investigations. Teachers could choose to take part in one small, focused activity or run a variety with one group or many.

Instructions for involvement and teaching resources could be found on the Royal Society of Chemistry website, including details of how to upload results and share information with others. All groups participating received a certificate.

The analysis below provides a description of the groups and participants involved. It should be noted that there were numerous duplicates included within the data. Where possible these have been removed in order to provide the most accurate picture of participant and school/organization involvement.

## Who are the participants?

Registrations for Mission Starlight were received from both organisations and individuals from the UK and international settings (Table 112).

**Table 112: Number of groups/organisations participating in Mission Starlight**

| | **Number of participating groups/individuals** |
|---|---|
| UK | 152 |
| International | 29 |
| **Total** | 181 |

The majority of the 181 organisations, schools or individuals (84%) were UK-based. The remaining 29 international groups came from a wide range of countries around the world including India, Uganda, Singapore, Ireland, Cambodia, China and Greece (amongst others).

**Table 113: Participants from the four home countries**

| Country | Number of participating groups/individuals | Percentage |
|---|---|---|
| England | 97 | 63.8 |
| Northern Ireland | 15 | 9.9 |
| Scotland | 11 | 7.2 |
| Wales | 3 | 2.0 |
| Unknown | 26 | 17.1 |
| **Total** | 152 | 100 |

Most groups were based in England which is perhaps not surprising bearing in mind the substantially higher population and school numbers (Table 113). Very few participant groups came from Wales. While some groups were known to come from the United Kingdom, we did not have information about which country specifically they were based in.

Although registrations were received from individuals and organisations, the majority were from school-based groups (Table 114). For the purposes of this analysis, 'school-based' also includes sixth form colleges. A small number of other groups who did not appear to be linked to schools directly included: home educators, individuals, community groups (e.g. brownies) and those linked to higher education. The seven 'unknown' entries are possibly individuals or groups of friends; however, we have no indication of details other than them being UK-based and the age phase within which they fit.

**Table 114: School-based participant groups**

| Type of organization | Both international & UK | UK-based only |
|---|---|---|
| School-based | 153 | 126 |
| Other organisations/individuals | 21 | 19 |
| Unknown | 7 | 7 |
| **Total** | 181 | 152 |

For the UK-based participants (both schools and non-schools), the majority are of secondary school age (Table 115). One fifth (21%) are primary age with a remaining 13 groups (8.6%) based in post-16 or higher education settings.

**Table 115: Participants by school phase.**

| School phase | Number of schools | Percentage |
|---|---|---|
| Primary | 32 | 21.1 |
| Secondary | 107 | 70.4 |
| Post-secondary | 13 | 8.6 |
| **Total** | 152 | 100.0 |

Of the 89 participating English schools over 45% were academies/autonomous schools (Table 116). There are considerably fewer community schools involved than might be expected based on the national figure. Perhaps most striking is the high proportion of independent schools that have opted to participate (29.4%) compared with a national figure of these school types of 6.8%. It is not clear why the project was so appealing to independent school teachers or pupils. It may be due to targeted advertising of the programme or the networks that are linked to the work of the Royal Society of Chemistry, meaning that awareness was higher in these schools. There could be other reasons (e.g. time for running the project, interest of pupils and staff, school specialisms) for the high proportion of independent schools compared with other school types but without further information it is impossible to know which ones are particularly relevant.

**Table 116: Types of establishment of participating schools**

| School type | Number | Percentage |
|---|---|---|
| Academy/Free School | 42 | 44.7 |
| Community School | 10 | 11.8 |
| Grammar School (selective) | 4 | 4.7 |
| Independent School | 25 | 29.4 |
| Voluntary Aided School | 6 | 7.1 |
| Unknown | 2 | 2.4 |
| **Total** | 89 | 100 |

Schools participating in Mission Starlight are, on average, broadly in line with the national average for FSM (Table 117). Mission Starlight schools tend to have slightly fewer students who have English as an Additional Language, perhaps linked to the geographical areas where participating schools were based.

**Table 117: Levels of disadvantage of Mission Starlight schools**

| Indicator of disadvantage | Average for Mission: Starlight Schools | National average |
|---|---|---|
| % FSM | 12.5 | 13.3 |
| % EAL | 9.8 | 13.0 |

However, it is important to remember that these characteristics are not necessarily associated with the children directly involved in Mission Starlight. They merely give an indicator of the student compositions of the schools choosing to participate. It is also important to remember that we do not have this information on independent schools. As a high proportion of the schools involved do have independent status, there is likely to be some skew in the data.

Overall a total of 5,637 young people took part in the Mission Starlight experiment. Table 118 gives details of the numbers of participants in both UK and international settings (minus duplicates).

**Table 118: Number of participants in UK and abroad**

| Type of organisation | Number of participants |
|---|---|
| School-based | 4858 |
| Other organisations/individuals | 709 |
| Unknown | 70 |
| **Total** | 5637 |

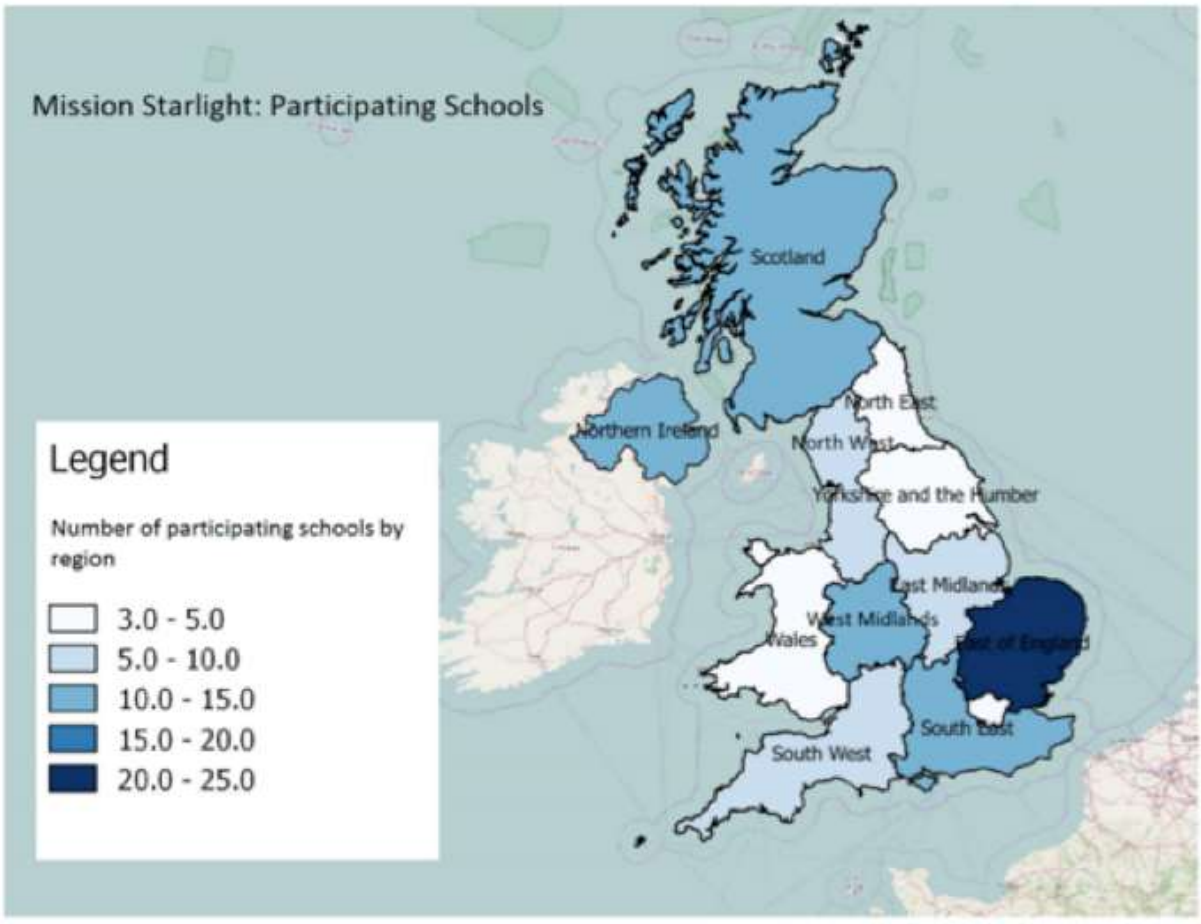
The majority of the participants (84.4%) are UK based. Duplicates were an issue with the original data, particularly as it appeared that the same groups of students were likely to have taken part in more than one experiment as part of the Mission Starlight project. These duplicates have been removed so that these

final figures reflect the number of students who have engaged in some way with Mission Starlight irrespective of whether they submitted information for one or more of the available experiments.

## Where do participants come from?

There is quite a wide spread of participating groups across the United Kingdom. The highest proportion of groups come from the East of England (see Figure 47). This figure does seem disproportionately high when compared to other, more highly and densely populated areas. It is possible, however, that the Royal Society of Chemistry's base in Cambridge (East of England) may have led to more direct links and networks within that area, encouraging more schools to participate.

**Figure 47: Geographical distribution of Mission Starlight schools**



# STARS PROJECT

The STARs project was run by the Astrobiology Society of Britain. It ran for a total of 5 months between February and June 2016. The initiative involved practicing scientists from across the UK going into schools and giving free talks and sessions on Tim Peake's Principia mission, life aboard the International Space Station, astrobiology and the prospect of becoming an astronaut. The project team also provided experiment packs for classes to engage with a live Facebook chat for online conversations with the scientists.

A total of 25 scientists from 13 different institutions delivered a total of 72 talks and workshops within both school settings and home education settings. Teacher evaluation forms were distributed following the project although only 15 were received back. From these 15 forms, it could be determined that 1,020 children (490 boys and 530 girls) participated in the STARs projects. Extrapolating these numbers across the full cohort of schools and participant groups involved in STARs has led the UK Space Agency to estimate that over 4,000 children were engaged with this programme.

A total of 51 schools and three other organisations/participant groups were involved in the initiative.

## Who are the participants?

The project was aimed at both primary and secondary-age children. Table 119 below gives detail of the age groups of the schools/groups involved.

**Table 119: School phase of participant groups**

| Age phase of schools/participant groups | Number | Percentage |
|---|---|---|
| All-through | 2 | 3.7 |
| Primary | 29 | 53.7 |
| Secondary | 23 | 42.6 |
| **Total** | 54 | 100 |

Almost half of the participating schools were academies (Table 120). We do not have data on the school types in Scotland and so these are listed as 'unknown'.

**Table 120: Type of schools participating in the STARS project**

| School type | Number | Percentage |
|---|---|---|
| Academy/Free School | 24 | 47.1 |
| Community School | 7 | 13.7 |
| Independent School | 4 | 7.8 |
| Voluntary School | 11 | 21.6 |
| Unknown | 5 | 9.8 |
| **Total** | 51 | 100 |

Schools involved in the STARS project had a slightly lower proportion (on average) of FSM pupils than the national average (Table 121). The proportion of EAL students, however, is in line with the national average. Data is only available for English, state-funded schools and so the data for Scottish schools and the four independent schools is missing.

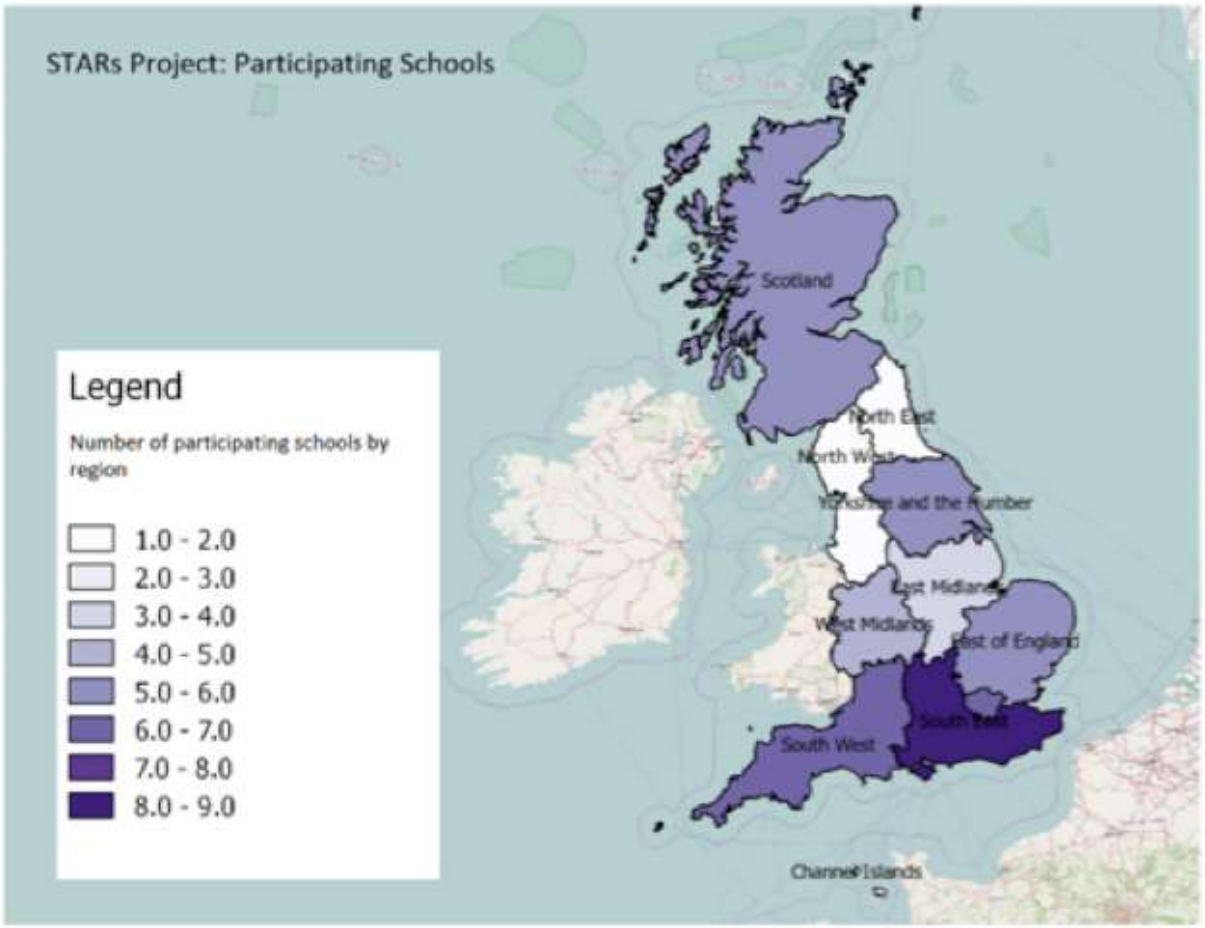
**Table 121: Levels of disadvantage of STARS schools**

| Indicators of disadvantage | Stars schools (%) | National average (%) |
|---|---|---|
| FSM | 9.3 | 13.3 |
| EAL | 13.4 | 13.0 |

## Where do participants come from?

The project aimed to reach students across the UK. As can be seen on the map, most of the schools in the STARs project came from the South East and South West of England (Figure 48).

**Figure 48: Geographical distribution of participating schools**




No students from Wales or Northern Ireland participated in this project. It is important to note here that involvement with this initiative may have relied on having access to a speaker from a local institution. Availability of such speakers is unlikely to have been equally spread across the regions of the UK. Table 123 gives details of the regions where participant schools and home-education groups were located.

**Table 123: Geographical distribution of participating schools/groups**

| Geographical distribution of schools/participant groups | Number | Percentage |
|---|---|---|
| East Midlands | 4 | 7.4 |
| East of England | 6 | 11.1 |
| London | 7 | 12.9 |
| North East | 1 | 1.9 |
| Northern Ireland | 0 | 0 |
| North West | 2 | 3.7 |
| Scotland | 6 | 11.1 |
| South East | 9 | 16.7 |
| South West | 7 | 12.9 |
| Wales | 0 | 0 |
| West Midlands | 5 | 9.3 |
| Yorkshire and Humber | 6 | 11.1 |
| Unknown | 1 | 1.9 |
| **Total** | 54 | 100 |

# THE BRITISH ASSOCIATION OF PLANETARIA

As part of the Mission's aim to generate public interest in space, the British Association of Planetaria hosted a number of events across the UK to screen stunning, high resolution, photo-realistic images in large, static and small, mobile planetarium domes. Inside the planetarium, guests could explore the different modules of the ISS and find out about the space laboratory's work in its exploration of the solar system. These planetaria also ran presenter-led planetarium shows and launched parties to celebrate Tim Peake's mission.

The estimation for school numbers is calculated after removing duplications. For example, some schools could have taken children from different year groups to these planetaria or visited the events more than once. These schools will be counted only once but the total numbers are added up for the multiple visits.

This project attracted over 139,345 visitors. Of these over 76,000 were students from 579 primary and secondary schools across the UK. The others were visitors to public events including family groups, youth clubs (e.g. Brownies and the Scouts) and students from higher education institutions and the general public. All the major Science centres were involved in hosting these events, for example, At-Bristol, Millenium Point, the London Science Museum, the Natural History Museum, national museums (Liverpool, Dales Countryside Museum and the National Maritime Museum).

It is not possible to count the number of organisations or groups involved because some were public events, like science fairs, science festivals and exhibitions visited by the general public. So the best estimate of the reach of the programme is number of participants registered for these events. Table 124 shows that over half of the participants were registered with schools, and the other half were either through youth clubs or public events.

**Table 124: Planetaria registrants from schools and other organisations**

| **Type of organisation** | **Number of participants** |
|---|---|
| School-based | 76, 126 |
| Non-schools (including families, general public and 3 higher education institutions) | 63,219 |
| **Total** | 139345 |

## Who are the participants?

The majority of the participating schools were primary schools and a small number of secondary schools. A few independent schools include children of all age groups (from primary to 16-18). Almost all the school participants were primary school children. Compared to the national figure, primary schools are overrepresented here (Table 125). This suggests that these planetaria events are particularly appealing to younger children.

**Table 125: Participants by phase of schooling**

| Phase of education | Number of Schools | % | National (%) | Number of Pupils | % |
|---|---|---|---|---|---|
| Primary (including one pre-school) | 483 | 83 | 68.9 | 61,666 | 81 |
| Secondary | 50 | 9 | 12.9 | 8,360 | 11 |
| All through | 46 | 8 | 0.5 | 6,100 | 8 |
| **Total** | 579 | 100 | | 76,126 | 100 |

Note: Three higher education institutions (universities) are not included as schools here because we are not sure if they were hosting venues or if the participants came from the institutions.

Proportionally, the kinds of schools in the Planetaria events are representative of the national picture, suggesting that this project has successfully captured pupils from the full range of schools in the UK (Table 126).

**Table 126: Planateria participants by school type**

| School type | Number of schools | | National | Number of Participants | |
|---|---|---|---|---|---|
| Academy and other autonomous schools | 158 | 27% | 24.6% | 24252 | 32% |
| Community School | 183 | 32% | 30.8% | 25591 | 34% |
| Independent School | 38 | 7% | 6.9% | 5474 | 7% |
| Voluntary School | 84 | 15% | 20.5% | 12054 | 16% |
| Special schools | 13 | 2% | 7% | 1576 | 2% |
| Unknown | 1 | 0% | | 20 | 0% |
| Others (N Ireland, Scotland, Wales and the Channel Islands) | 102 | 18% | 7% | 7159 | 9% |
| **Total** | 579 | 100% | 100% | 76126 | 100% |

Planetaria events have been fairly successful in involving relatively disadvantaged schools (Table 127). Planetaria schools have proportionately more FSM and EAL pupils than that national average, and they are also likely to be bigger schools.

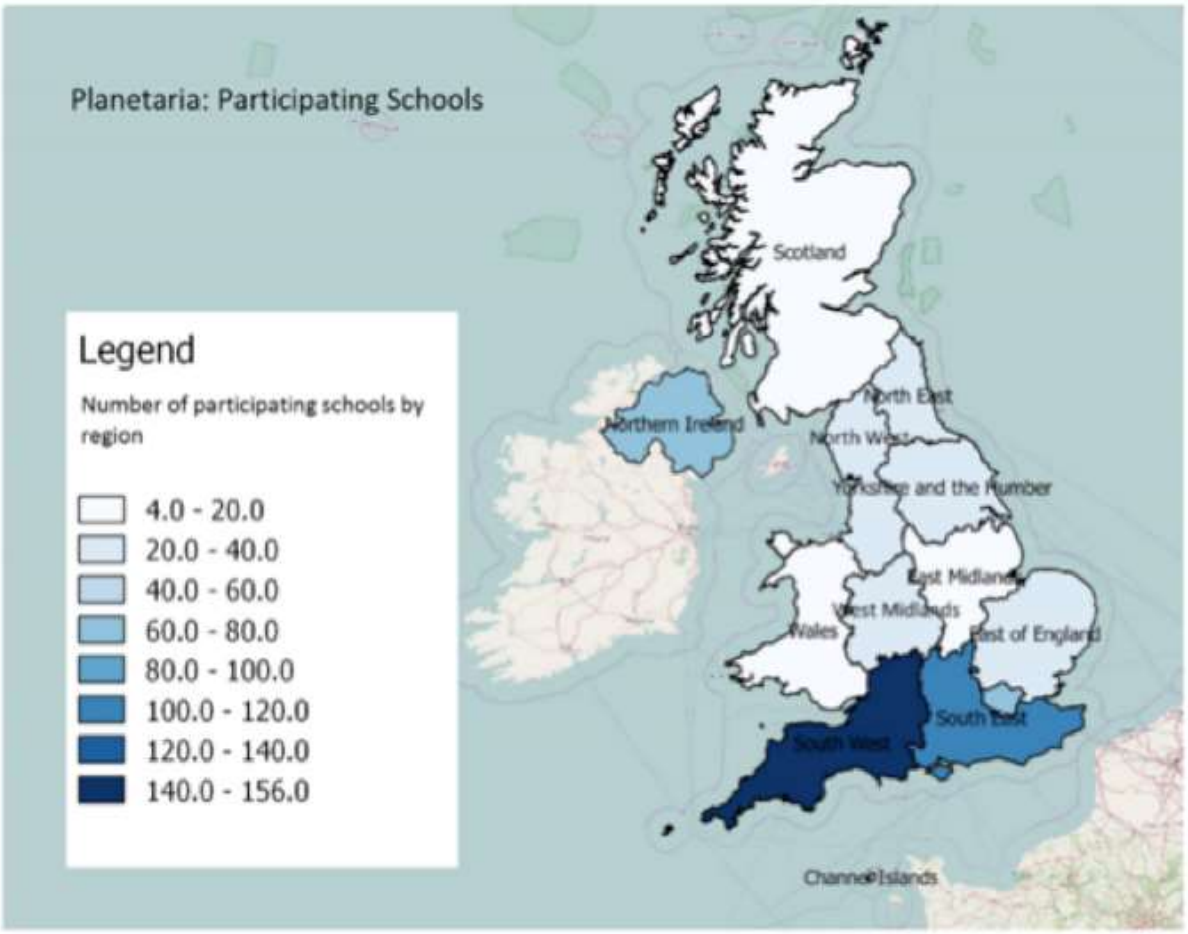
**Table 127: Levels of disadvantage of Planetaria schools**

| Indicators of disadvantage | Planetaria schools (%) | National average (%) |
|---|---|---|
| %FSM | 25.3 | 13.3 |
| %EAL | 16.1 | 13.0 |
| School size | 415 | 350 |

## Where do participants come from?

It is clear from the map (Figure 49) that most of the schools that took part in the activities associated with the British Association of Planetaria came from the East of England. Schools in the southern coastal belt of England also dominated the distribution.

**Figure 49: Geographical distribution of Planetaria schools**




Compared to the national distribution of schools, schools in the South West are overrepresented (Table 128). Over a quarter (27%) of the participating schools came from the South West whereas only 9% of schools in England are located there. Apart from the South East and the South West, schools in all other regions are underrepresented compare to the national distribution.

**Table 128: Geographical distribution of Planetaria schools and participants**

| Geographical regions | Number of schools | % | National (%) | Number of participants | % |
|---|---|---|---|---|---|
| East Midlands | 10 | 2% | 8.5 | 1633 | 2% |
| West Midlands | 30 | 5% | 10.1 | 5674 | 7% |
| North East | 36 | 6% | 4.5 | 3085 | 4% |
| North West | 23 | 4% | 13.3 | 4322 | 6% |
| East of England | 32 | 6% | 10.7 | 6493 | 9% |
| London | 61 | 11% | 12.1 | 11271 | 15% |
| South East | 103 | 18% | 15.9 | 13188 | 17% |
| South West | 156 | 27% | 8.9 | 20426 | 27% |
| Yorkshire and the Humber | 25 | 4% | 9.2 | 2780 | 4% |
| Wales | 9 | 2% | 6.2 | 577 | 1% |
| Scotland | 12 | 2% | 0.6 | 1107 | 1% |
| N Ireland | 78 | 13% | | 5344 | 7% |
| Ireland and Jersey | 4 | 1% | | 226 | 0% |
| **Total** | 579 | 100% | 100 | 76126 | 100% |

As expected participating schools tended to be from urban towns and cities. What is interesting is that the Planetaria events have attracted a proportionally large number of schools in the rural hamlets. These are overrepresented compared to the national distribution of schools (Table 129). The Others/Unknown are largely schools in N Ireland and a small number in Wales and Scotland.

**Table 129: Locality of Planetaria schools**

| Types of locality | Number of schools | % | National (%) |
|---|---|---|---|
| Urban conurbation | 127 | 22 | 32.6 |
| Urban town and city | 244 | 42 | 40.9 |
| Rural town and village | 79 | 14 | 20.6 |
| Rural hamlet and isolated | 18 | 3 | 5.1 |
| Others/Unknown | 111 | 19 | 0.7 |
| **Total** | 579 | 100 | 100 |

## Non-school participants

There are a total of 98 groups/institutions that were involved with Planetaria activities. These included clubs and societies (e.g. Northampton natural history society, stargazing workshops, photographic society, astronomy clubs, horticultural society and the Women's Institute), youth clubs (e.g. Brownies and Beavers) and a number of 'undisclosed' schools, families and home educators. The numbers from the public included the numbers recorded at several science fairs, science festivals and national museums across the country. It is not clear if the numbers recorded by the museums and the public venues where the Planetaria events were held included the schools that visited these places. If so, then we could be counting the same school and pupils twice.

The total number of participants that were involved in the Planetaria events as members of the public (i.e. they did not go with their schools) was recorded as 63,219. These include members of the public, private individuals and some are records of numbers from hosting venues.

Close to a quarter of these public registrations and public events were held in the South West of England. Scotland recorded the next highest number of public registration (Table 130) . However, in terms of numbers, the biggest draw was in the West Midlands accounting for over a third (35%) of the total public participants.

**Table 130: Geographical distribution of non-school participants**

| Geographical regions | Number of groups/venues | % | Number of participants | % |
|---|---|---|---|---|
| East Midlands | 10 | 10% | 760 | 1% |
| West Midlands | 3 | 3% | 22564 | 36% |
| North East | 5 | 5% | 5089 | 8% |
| North West | 4 | 4% | 13401 | 21% |
| East of England | 14 | 14% | 7514 | 12% |
| London | 3 | 3% | 1925 | 3% |
| South East | 11 | 11% | 3128 | 5% |
| South West | 22 | 23% | 6156 | 10% |
| Yorkshire and the Humber | 1 | 1% | 150 | 0% |
| Wales | 4 | 4% | 107 | 0% |
| Scotland | 17 | 18% | 2300 | 4% |
| N Ireland | 2 | 2% | 105 | 0% |
| Ireland | 1 | 1% | 20 | 0% |
| **Total** | 97 | 100% | 63219 | 100% |

# SPACE DIARIES

The Space Diaries project created by The Curved House allowed students to create their own book to document their Principia activities. Class teachers from primary schools in England, Scotland, Wales and Northern Ireland signed-up to the website to access the entire Space Diary for free, plus lesson plans, teaching materials, games and extension activities. The Space Diary combines literacy and visual literacy learning with STEM subject learning to create fun, engaging activities for students aged 6-8. Schools could also order printed copies of the Space Diaries so that children could complete their own physical book.

The data that we have available relate to the 2015-2016 and 2016-2017 academic years. The figures below are based on data provided on number of students, registrants, sets of resources ordered and postcodes. In a number of instances the data received were incomplete or did not give an indication of whether the resources were intended for use in schools or by other groups/individuals. Where possible we have tried to determine if participants are school-based or not but in some cases this cannot be known for sure and so these entries are not included within the analyses of school participants.

## Number of participants

Table 131 indicates the number of participants involved in each year of the project. This total is based on data on the number of sets of resources that were ordered by registrants (i.e. schools, parents, home educators, clubs).

**Table 131: Number of participants over two years 2015/16 to 2016/17**

| Year | Number of participants |
|---|---|
| 2015-2016* | 62340 |
| 2016-2017 | 43263 |
| **Total** | 105603 |

*The first set of data are based on estimates depending on whether participants sought to download one or two sets of resources (30 or 60) or whether they opted for the DIY resources (which were estimated by the UK Space Agency at 30 children per registrant)

We have also looked at the number of registering groups and individuals. The project has clearly had a wide reach, allowing over 2600 groups and individuals to engage with the Space Diary programme. The second column of Table 132 shows the number of registrants after removal of duplicates.

**Table 132: Number of registrants and registering groups/individuals**

| Year | Number of registering participant groups/individuals | Number of different registrants/individuals (without duplicates) |
|---|---|---|
| 2015-2016 | 1736 | 1416 |
| 2016-2017 | 1289 | 1232 |
| **Total** | 3025 | 2648 |

Focusing specifically on school-based participants, there were considerably more schools involved in the 2015-2016 year of the programme whereas in 2016-2017, the majority of those registering were home educators. Across both years and the total number of different registrants (2,648), 55% of those were based in schools (Table 132).

## Who are the participants?

Here we consider school participants only for which we have information about their schools. The vast majority (95%) of school groups that registered for Space Diaries were primary schools. A very small proportion of all-through schools and secondary schools registered but the programme was very much targeted at younger children and this appears to be the group that utilized the resources most.

The types of school that participated in Space Diaries are broadly in line with the national averages indicating a broad spread across different school types (Table 133).

**Table 133: Registrants by types of school**

| Types of school | Number | Percentage |
|---|---|---|
| Academy Schools | 275 | 19.1 |
| Community Schools | 483 | 33.6 |
| Independent Schools | 81 | 5.6 |
| Pupil Referral Units | 2 | 0.1 |
| Special Schools | 33 | 2.3 |
| Voluntary Schools | 305 | 21.2 |
| Unknown | 259 | 18.0 |
| **Total** | 1438 | 100.0 |

Note: The information that we have on school type refers to schools in England only. Schools in the devolved nations and internationally are listed as 'Unknown'.

## Where do participants come from?

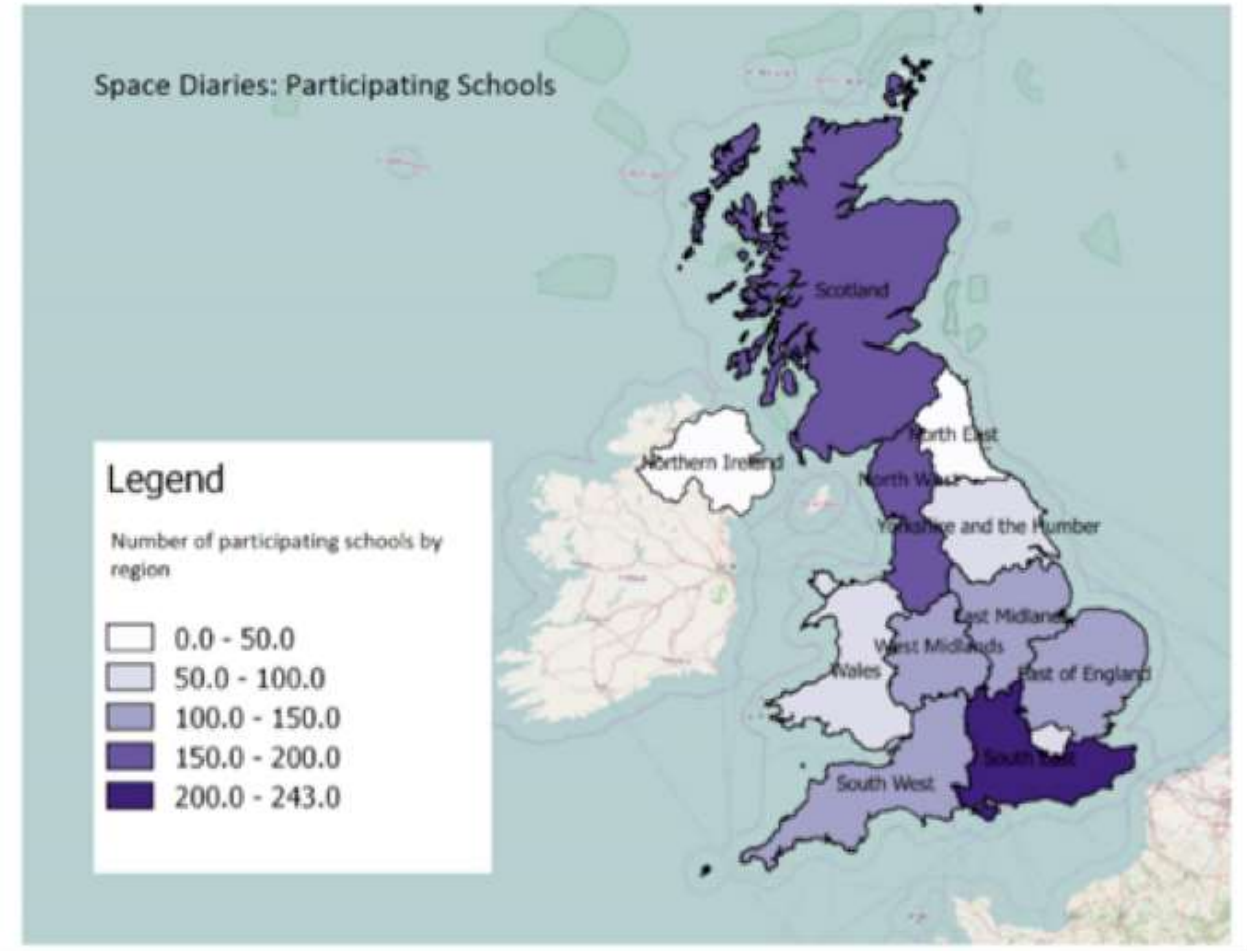
Schools involved in Space Diaries are mostly very much in line with what we would expect in terms of national distribution. It is interesting that the London area seems to be somewhat under-represented by school participants although it is possible that registrants from other groups or individuals were from this area rather than schools. In addition to registration from England, Wales, Scotland and Northern Ireland where the project was targeted, 20 schools in international settings also participated. The project clearly had a wide geographical reach.

**Table 134: Geographical distribution of Space Diaries entrants**

| Geographical regions | Number | Percentage | National (%) |
|---|---|---|---|
| East Midlands | 109 | 7.6 | 8.5 |
| East of England | 145 | 10.1 | 10.7 |
| London | 74 | 5.1 | 12.1 |
| North East | 37 | 2.6 | 4.5 |
| North West | 173 | 12.0 | 13.3 |
| Northern Ireland | 21 | 1.5 | N/A |
| Scotland | 164 | 11.4 | N/A |
| South East | 244 | 17.0 | 15.9 |
| South West | 149 | 10.4 | 8.9 |
| Wales | 63 | 4.4 | 6.2 |
| West Midlands | 141 | 9.8 | 10.1 |
| Yorkshire and Humber | 98 | 6.8 | 9.2 |
| International | 20 | 1.4 | N/A |
| **Total** | 1438 | 100.0 | |

The map below (Figure 50) replicates the data in Table 134 and shows visually that most of the participating schools were based in the South East of England, the North West and Scotland. London and the North East are clearly underrepresented.

**Figure 50: Map showing geographical distribution of Space Diaries participating schools**




# THE ASTRO SCIENCE CHALLENGE

This Challenge was an interactive space adventure free to all UK schools, home educators and families created by Unlimited Theatre. It was aimed at children aged 7-11 and was a collaborative project involving leading science organisations such as the UK Space Agency, the Met Office, The Science Museum, the British Science Association and others. Children are invited to sign up as space agents and take on missions during which they learnt about space weather, astronomy, computer coding and nutrition.

The Astro Science Challenge used a range of online film, stories and classroom activities and provided free lesson plans for teachers. Unlimited Theatre have also created a story world, accessed through an app or on desktops, which references the science behind the missions and aims to enhance children's understanding through the use of fictional characters.

Students could use the Astro Science Challenge app to follow the story, create their own Cadet account and choose their avatar, to write and upload all their work and to claim badges when they've finished a Mission. Team Leaders could monitor their Cadets' progress and award badges for completed Missions though the Team Leader Admin section on the website.

## Numbers of registrants and participants

A total of 650 different schools, organisations or individuals registered with the Astro Science Challenge. Just over half of these were from schools and just over 40% were non-school based (Table 135). The vast majority of non-school based participants were home educators although there were a small number of other organisations such as Cub Scout groups, Beaver groups, nurseries and one choral group.

**Table 135: Number of registrations for Astro Science Challenge**

| **Registrants** | **Number of registrations** | **Percentage** |
|---|---|---|
| School-based | 370 | 56.9 |
| Non-school based | 280 | 43.1 |
| **Total** | 650 | 100.0 |

Table 136 summarises the information that we have on the number of accounts set up by organisations and individuals. It shows that 786 separate adult accounts were set up. In most cases each organisation or individual just set up one account but in some instances two or more were created. The student/young person accounts refer to the number of accounts that the participating children created from each of the adult accounts. While we have been advised that this could indicate the number of children who have participated in the programme as a whole, we would question whether this is necessarily the case. Over 400 of the organisations have a zero listed in the 'student/young person accounts' column. While it may be the case that many children did not create their own account, they still may have engaged with the programme via the lesson resources and activities that could have been accessed through the adult account. We would, therefore, suggest that the total figure of 5,626 as number of student participants is

possibly a conservative total. Without further, more detailed data, it is impossible to know the full reach of the initiative.

The final two columns refer to the number of posts (i.e. the number of webpages) created by participants and the number of comments (text-based messages online) left. We do not have information on whether these were created by the same or different children within each school or organisation.

**Table 136: Number of accounts set up by individuals and groups (school-based and non-school based)**

| | **Adult accounts** | **Student/young person accounts** | **Posts** | **Comments** |
|---|---|---|---|---|
| School-based registrants | 489 | 5321 | 954 | 20496 |
| Non-school based registrants | 297 | 305 | 284 | 1113 |
| **Total** | 786 | 5626 | 1238 | 21609 |

## Who are the participants?

The majority of participants were primary schools. Based on the 347 school-based groups for which we have information, there appears to be fewer academy schools than might be expected based on national averages and a higher number of community schools and voluntary schools (Table 137). However, this may be because only about 15% of primary schools across the country have gained academy status.

**Table 137: Astro Science Challenge participants by school type**

| School Type | Number | Percentage |
|---|---|---|
| Academy/autonomous School | 78 | 22.5 |
| Community School | 137 | 39.5 |
| Independent School | 19 | 5.5 |
| Pupil Referral Unit | 1 | 0.3 |
| Special School | 7 | 2.0 |
| Voluntary Aided/Controlled School | 70 | 20.2 |
| Unknown | 35 | 10.1 |
| **Total** | 347 | 100.0 |

Schools that participated in the Astro Science Challenge are broadly similar to those of the national schools in terms of the proportions of FSM and EAL children. It is important to remember that there is no available data on these indicators for the 19 independent schools or schools in Wales, Scotland or Northern Ireland.

**Table 138: Levels of disadvantage of Astro Science Challenge schools**

| Indicators of disadvantage | Participant schools % | National average % |
|---|---|---|
| FSM | 11.7 | 13.3 |
| EAL | 13.8 | 13.0 |

## Where do participants come from?

Although almost all registrants were UK-based, about 5% (n=32) of registrants came from outside the UK (Table 139). A number of these international participants were based in British or International schools in countries such as Slovakia, Malaysia and South Korea. There were also other registrants from Australia, USA, Canada and Ireland. It can be said that this project has been successful in reaching out to British pupils overseas.

**Table 139: Numbers of UK-based and international registrants**

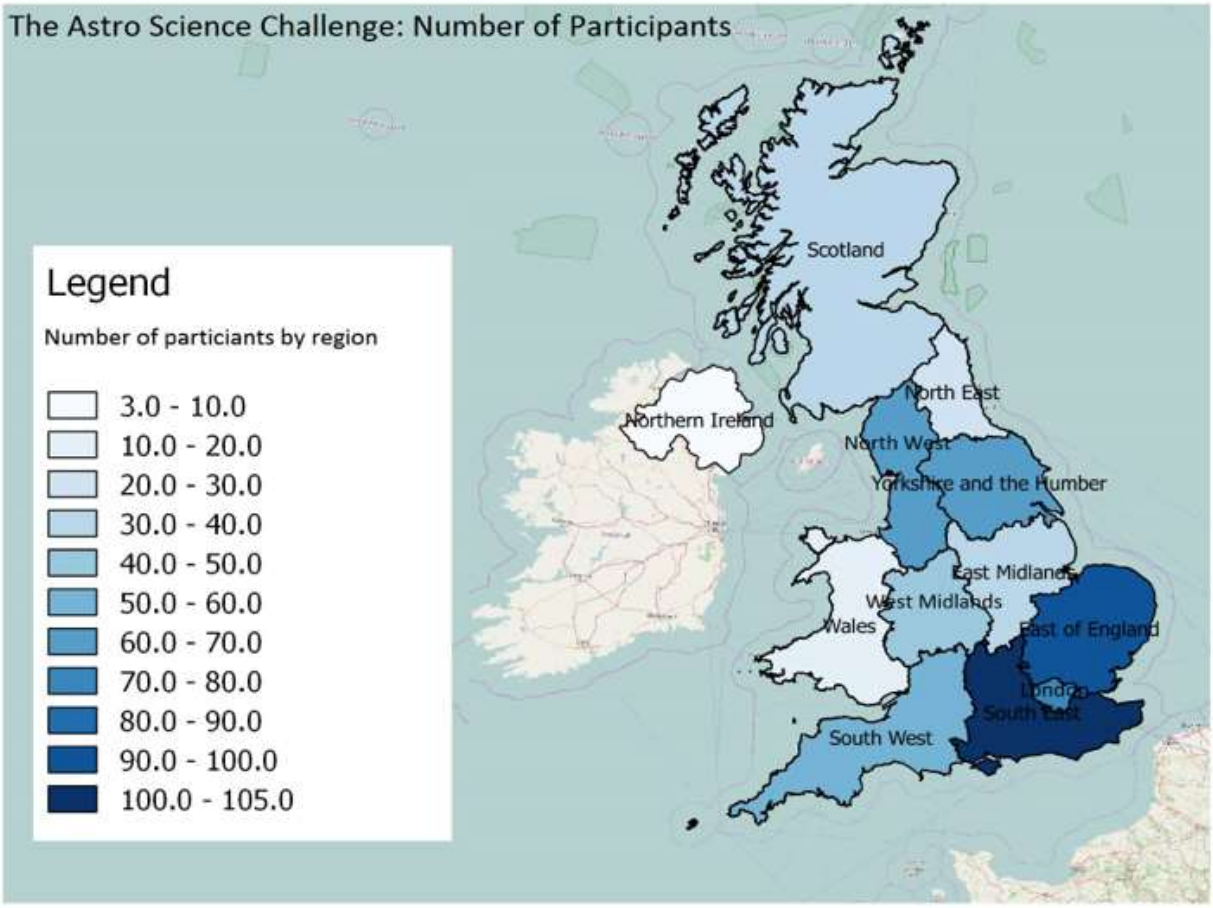
| **Registrants** | **Number** | **Percentage** |
|---|---|---|
| UK-based | 617 | 94.9 |
| International | 32 | 4.9 |
| Unknown | 1 | 0.2 |
| **Total** | 650 | 100.0 |

Within England, registrants from the South East and the East of England are overrepresented, but overall the distribution of participants is what is expected considering the national spread of schools (Table 140).

**Table 140: Geographical distribution of Astro Science Challenge registrants**

| Region | School-based registrants | Non-school registrants | All registrants | All registrants (%) | National (%) |
|---|---|---|---|---|---|
| East Midlands | 24 | 13 | 37 | 6.0 | 8.5 |
| East of England | 46 | 49 | 95 | 15.4 | 10.7 |
| London | 37 | 41 | 78 | 12.6 | 12.1 |
| North East | 14 | 10 | 24 | 3.9 | 4.5 |
| North West | 40 | 22 | 62 | 10.0 | 13.3 |
| Northern Ireland | 2 | 1 | 3 | 0.5 | N/A |
| Scotland | 26 | 5 | 31 | 5.0 | N/A |
| South East | 45 | 60 | 105 | 17.0 | 15.9 |
| South West | 26 | 26 | 52 | 8.4 | 8.9 |
| Wales | 5 | 10 | 15 | 2.4 | 6.2 |
| West Midlands | 33 | 17 | 50 | 8.1 | 10.1 |
| Yorkshire and Humber | 49 | 16 | 65 | .5 | 9.2 |
| **Total** | 347 | 270 | 617 | 100 | |

**Figure 51: Geographical distribution of Astro Space Challenge participants**




Considering the types of locality of the participants, Table 141 shows that half of the participating schools are in towns and cities and a third in large conurbations (Table 141).

**Table 141: Locality of Space Challenge schools**

| **Location** | **Number** | **Percentage** |
|---|---|---|
| Urban conurbation | 102 | 29.4 |
| Town/city | 174 | 50.1 |
| Rural village or hamlet | 36 | 10.4 |
| *Unknown | 35 | 10.1 |
| **Total** | 347 | 100.0 |

*The 'Unknown' refers to schools in Wales, Scotland or Northern Ireland for whom no location data is available in the Schools Census.

## NOVIUM MUSEUM

The Novium Museum in Chichester hosted a number of activities to support the Tim Peake mission. These included an exhibition, a series of workshops, loan boxes and sleepovers for children in the museum. The data we have refers to the education sessions (workshops), the sleepovers and the loan boxes.

The UK Space Agency has estimated that 300 children participated in the sleepovers and 330 in the education sessions. We do not have student-level data on these children but we do have some information about their schools. A total of 36 groups were involved in the Novium Museum activities. 32 of these were primary school groups and a further four were Brownie or Cub Scout groups.

All participant groups were from the South Coast or South East areas within a relatively close travelling distance of Chichester. Two thirds (20) of the groups were from West Sussex, seven were from Hampshire and the remainder were from Surrey, Bournemouth and the Isle of Wight. Half of the schools were based in rural areas and the other half were based in urban areas (mainly Guildford, Bournemouth or Brighton).

## THE ROYAL INSTITUTION LECTURES

These lectures included a series of teaching resources for primary and secondary schools produced by The Royal Institution (RI) based on their popular 2015 Christmas Lecture, *How to Survive in Space.*

For primary schools there was a series of three lessons. In *Lift Off!* Students learnt about a rocket launch and what it takes to send a rocket to space. *Life in Orbit* explains what needs to be done to keep alive in space. *The Next Frontier* focused on the challenges posed by extremely long space journeys, and how to provide enough food and water to keep astronauts going.

For secondary schools, the teaching resources were for enhanced chemistry, physics and biology lessons. For each of these lessons, a pack including teaching ideas, information and worksheets for short, medium or long term activities was provided.

Based on the number of video clips, which is currently at around 480, it is estimated that the lessons would have been used with approximately 14,400 students (assuming a class size of 30).

## ABERDEEN SCIENCE CENTRE

This project has seen the expansion and enhancement of the space zone at Aberdeen Science Centre (ASC) through the creation and installation of an interactive lab module exhibit, based on the Columbus research module of the International Space Station (ISS). This facility has provided all visitors to ASC with the opportunity to participate in a range of hands-on science, technology engineering and mathematics (STEM) practical activities and challenges in a themed and immersive environment.

We do not have participant/school data for this project but it is estimated that 14,507 visitors had been to the exhibition from January 2017 to March 2017. These included families, clubs/societies, groups, schools and community events.

## "ADVENTURES IN SPACE AND TIM" PODCAST

This is a series of podcasts hosted by comedian and space enthusiast Helen Keen (creator of BBC Radio 4's multi-award-winning *It Is Rocket Science*). This podcast was inspired by Tim Peake's mission.

The series has attracted a wide range of interviewees from well-known names such as astronauts, Helen Sharman and Chris Hadfield, to the experts working behind the scenes at the Royal Observatory Edinburgh and the James Webb Space Telescope. The series aimed to bring material scientists, rocket scientists and people putting the theory into practice together in one place.

This project aims to reach a target of 20,000 listeners by December 2017 when the podcast hosting ends. We do not have data on school or individual participants, but we know that over 13,000 listeners had already tuned in to the podcasts as of 30 March 2017. This figure is likely to rise over the series as more people tune in. In fact, steady increases had already been reported since the launch of the new round of Facebook advertisements.

This is a report commissioned by the UK Space Agency to establish the reach and spread of a programme of 34 projects based on the interest and educational opportunities arising from the astronaut Tim Peake's Principia Mission to the International Space Station (ISS) projects.

*Report submitted in May 2017*

Produced by: Durham University