

## Family Space Explorers

### What was Family Space Explorers?

During October 2017 to March 2018, the Family Space Explorers project supported parents/carers and their pre-school children to use storybooks to talk about space and introduced families to the work of the UK Space Agency.

NUSTEM developed two different activity sessions linked to the UK Space Agency: the ISS and robotic exploration of Mars. The ISS session was based on 'Goodnight Spaceman' by Michelle Robinson and Nick East (ISBN: 0141365625). The robotic exploration book, 'Are we nearly there yet?', was written by Carol Davenport because there were no suitable commercially available books. Further details about each session are given in Appendix 1.

'Are we nearly there yet?' was created using images taken from a range of robotic space missions which were used to tell the story of 'Little E' on her way to Mars. Little E is named for the rover that will head to Mars as part of the ExoMars 2020 mission.



The Family Space Explorer project was very successful in creating two engaging and educational activity sessions for pre-school children. Over 355 families (approximately 780 people) in the north of England have taken part in high-quality workshops that introduced them to the work of UK Space Agency, and provided a model to support adults and children to talk about space and science. By giving a book to take home, and online materials, ongoing reading of the book and interactions with UK Space Agency supported science can take place.

The majority of participants felt that their knowledge of the UK Space Agency had increased as a result of the workshop, and learning about space was regularly mentioned positively in the feedback. In addition, the majority of adults reported that they felt more comfortable to talk about space with their children following the activity.

NUSTEM would like to take this opportunity to thank UK Space Agency for the opportunity to develop this area of our pre-school work further.

### Key Lessons Learned

- 49% adult participants at the activity sessions had not heard of the UK Space Agency and 63% were unable to name any space missions.
- Encouraging shared reading and activities using STEM-related literature increased the reported level of knowledge and confidence to talk about space and science for adults caring for young children.
- Providing a free book allowed for continued discussion at home, as did online materials.
- Free nursery care for 2- and 3- year olds from more deprived backgrounds had two effects on the Family Space Explorer project: fewer pre-school families over all, and often only one (younger) child with each adult.

## Delivery

### Activity Sessions

The bulk of the delivery for Family Space Explorers was carried out in four local authority areas in the North East: Newcastle, Gateshead, North Tyneside and Durham. In addition, deliveries have also take place in Yorkshire and Cumbria. These deliveries were additional to those originally planned, and represent the start of a legacy for the project.

A range of venues were approached to host the activity sessions, including local libraries, a science centre and a natural history museum. Where possible, venues were asked to host two sessions in consecutive weeks to encourage families to return and take part in both activity sessions. A summary of the audience figures for the project is given in Table 1.

Audience	Forecast	North East	North West	Yorkshire
<i>Session audiences</i>				
<b>Families - adults</b>	256	242	13	104
<b>Families - children</b>	494	262	28	~104
<b>Teachers</b>	30	22	-	-
<b>Undergraduate students</b>	16	5	-	-
<b>Total</b>		<b>531</b>	<b>41</b>	<b>~208</b>
<i>Other metrics</i>				
<b>Number of sessions</b>		42	2	1
<b>Schools receiving book</b>	240	250	-	-
<b>Website unique views</b>	-	441		

Table 1: Audience data for Family Space Explorers

At the start of each North East session, participants were asked to complete a short pre-session survey which captured demographic data for themselves and their child(ren). However, not all participants completed the surveys, and so there are discrepancies between the total number of participants and the totals obtained from demographic data given below. In addition, demographic and evaluation data was not gathered from the additional delivery sessions. In the North East the pre-session sample size was 186 and post-session sample size was 150 giving a complete evaluation data-set for 62% of participants. However, it is likely that this data is representative of the rest of the population of the families that took part.

The age range and gender of the adults who attended the session are given in Figure 1. The majority of adults were aged between 25 and 44, and female (87.6%).

Participants were asked how many children they have brought with them, and their ages. Figure 2 shows that the majority of adults were accompanied by only 1 child. Part of the reason for this is that for those sessions which took part during term-time (25 out of 42 deliveries), older siblings (4+) would be in formal education and unable to attend.

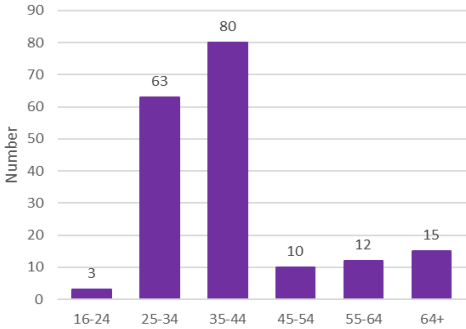


Figure 1 Age range of adults attending FSE

There was a good balance of girls (47%) and boys (53%) attending the sessions. Figure 3 shows the age distribution of the children attending. As expected, there is a peak in ages between 2 and 3 which was the target age range, and also before children start formal education. However, there were some older children (during school holidays) and younger children who also attended.

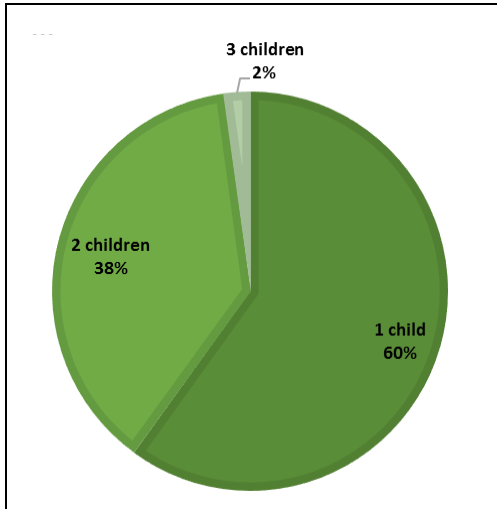


Figure 2: family size at FSE sessions

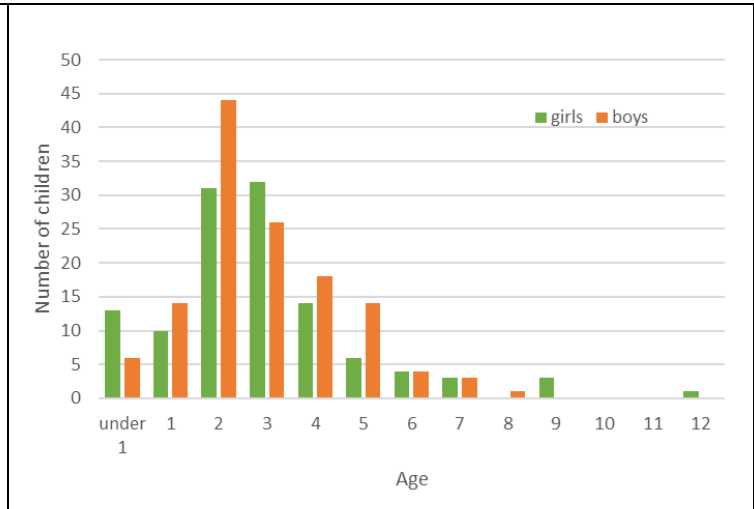


Figure 3: Age and gender of children

Although the number of adults attending Family Space Explorers in the North East was in line with the number predicted, the number of children attending was lower than anticipated. This can be ascribed to two factors. Firstly, due to the short time-scale between the project starting, and booking sessions with venues, the number of deliveries that took part in October half-term was fewer than originally planned. This reduced the number of multiple-child families who could attend a session. Secondly, the extension of free childcare to 30 hours for eligible two, three and four year olds meant that more of the target audience were in formal childcare settings rather than being looked after by a family member. This led to many delivery sessions having a smaller number of families attending than anticipated.

### Primary schools and teacher CPD

A copy of 'Are we nearly there yet?' was sent to 250 nurseries and schools in 6 North East local authority areas, chosen for the percentage of pupils receiving free school meals. Along with each book was a letter inviting a teacher from the setting to a CPD session to show how to use the story book to support literacy and science. Teachers from nurseries and schools attended a CPD session, and were provided with 'Are we nearly there yet?' books to enable them to run the activity sessions in their own settings.

### Family Space Explorer webpages

A dedicated set of webpages were developed on the NUSTEM website which provided information about the Family Space Explorer project. (<https://nustem.uk/family-space-explorers/>). Two of the webpages were specific to each book. The two books were also give unique URLs and the link included in each book. This meant that we could track direct views linked to receiving a book.

Table 2 gives the detailed breakdown of the website statistics for the Family Space Explorer pages. The 'Entrances' figures represent the number of views that started at that page. This allows us to estimate the number of people who wanted to follow-up the face-to-face session. Although the figures are small

it can be seen that the page for ‘Are we nearly there yet?’ had more views, and more direct entrances than the page for ‘Goodnight Spaceman’. In addition, for ‘Goodnight Spaceman’ the bounce rate (arriving at a page and leaving almost immediately) is much higher, and the dwell time lower, than for any other page. This suggested that the mixture of fact and story in ‘Are we nearly there yet?’ provoked more engagement and curiosity about the subject.

Page	Views	Unique views	Dwell time (min:sec)	Entrances	Bounce rate
Main page: family-space-explorers	392	144	0:51	91	14%
‘Goodnight Spaceman’ Book	56	28	0:22	4	50%
‘Are we nearly there yet?’ book	72	32	0:41	13	23%
News	65	30	0:57	13	33%
CPD	135	69	1:07	31	32%
Other events listings	281	138	0:34	26	35%

Table 2: Web analytics for Family Space Explorer October 2017 – 19 March 2018

## Evaluation process and analysis of findings

All participants attending the North East sessions were asked to complete short pre- and post-session surveys (available on request). The pre-surveys gathered demographic data, knowledge about space exploration and UK Space Agency, and how comfortable the adult felt when talking about science or space with their child(ren). The post-survey asked participants to reflect on the memorable aspects of the session, how their feelings and knowledge had changed, and whether they would re-read the book again. Participants were also asked if they would be willing to take part in a follow-up interview.

### Pre-Survey Analysis

#### *Knowledge of UK Space Agency and space exploration*

Table 3 shows the responses to the question ‘Have you heard of UK Space Agency before today? It can be seen that there was a fairly even split of prior knowledge amongst participants.

yes	46 %
No	49 %
Not sure	5 %

Table 3: Responses to ‘Have you heard of UK Space Agency before today?’ (n=187)

Participants were asked to name any space missions that they already knew about. There were a range of answers, including one or two fictional missions. Table 4 shows the number of space missions that participants knew, and a full list of the named missions are provided in Appendix 2.

None known	63 %
1 mission	21 %
2 missions	6 %
3 missions	5 %
4+ missions	3 %
Not a space mission	2 %

Table 4: Number of space missions that participants named. (n=189)

Table 5 shows the number of space missions that participants could name as a function of knowing about UK Space Agency. Of participants who had not heard of the space agency the majority (78%)

were also unable to name any space missions, suggesting that they had low prior knowledge about space overall. Interestingly, 50% of participants who stated that they had heard of the UK Space Agency were also unable to name any space missions.

Heard of UK Space	Number of space missions named				
	0	1	2	3	4+
No (n=91)	78%	17%	4%	0	1%
Yes (n=86)	50%	27%	7%	10%	6%

Table 5: Number of space missions named and knowledge of UK Space Agency

### Talking about Space and Science

Participants were asked about how comfortable they felt when talking to their child about space and science. Figure 4a shows the variation in comfort amongst participants, and Figure 4b shows level of comfort as a function of the number of space missions that participants named.

The majority of participants (63%) were comfortable talking to their child(ren) about science and space, with only 3% saying that they felt very uncomfortable. Unsurprisingly, as the named number of space missions increased the proportion of participants who felt very comfortable also increased. Amongst those participants who couldn't name any missions 18% felt very comfortable, and this increased to 67% for 3 missions and 83% for 4 missions.

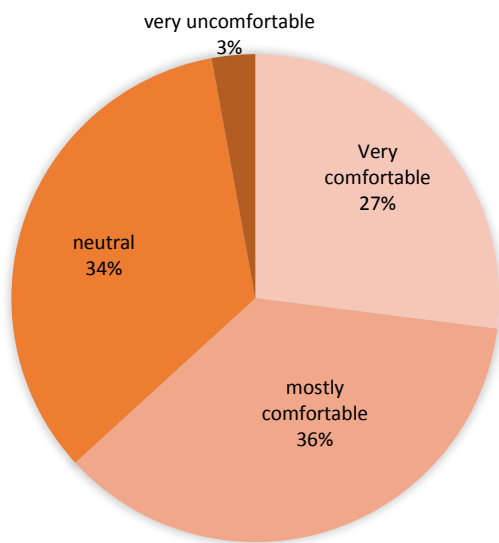


Figure 4a. Participants reported level of comfort when talking to child(ren) about science and space

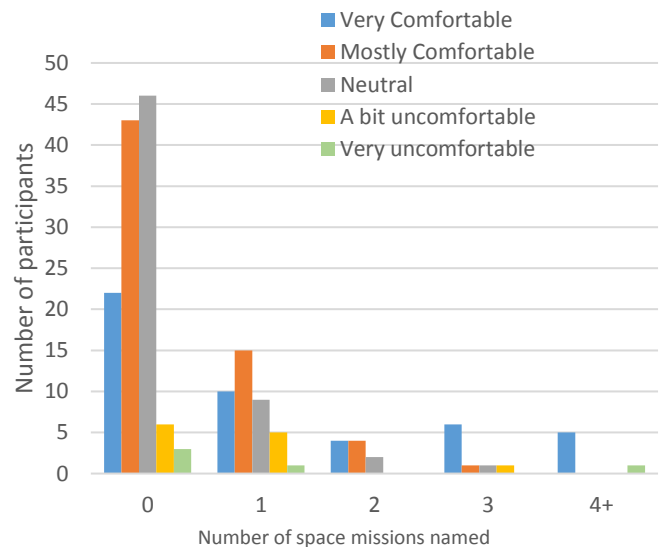


Figure 4b. Participants reported level of comfort when talking to child(ren) about science and space as a function of the number of space missions they named.

### Post-survey analysis

#### Knowledge of UK Space Agency

Following the session, participants were asked to rate the change in their knowledge of the UK Space Agency. The majority of participants said that their knowledge of UK Space agency had increased 'a bit

more' (54%) or 'a lot more' (15%). Figure 5 shows the change in knowledge depending on whether participants had heard of UK Space Agency before the session. It can be seen that even those participants who had heard of the UK Space Agency before the session still gained new knowledge from the session. There were some participants who hadn't heard of the UK Agency beforehand, and who did not feel that their knowledge of the UK Space Agency had increased, but the majority felt did feel that their knowledge had increased as a result of the session.

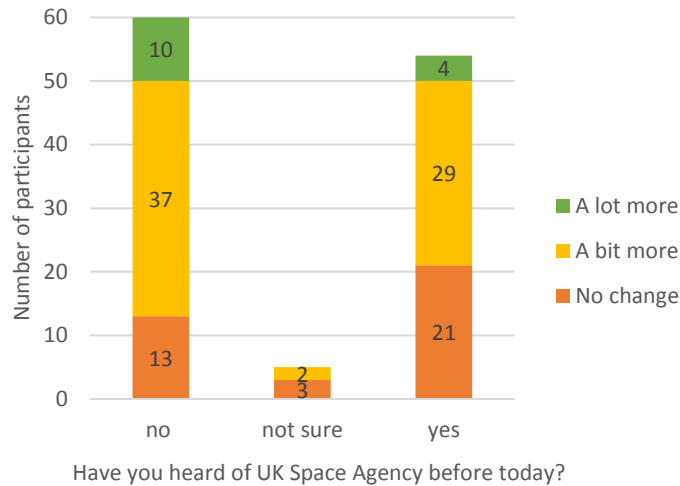


Figure 5. Change in participants' knowledge of the UK Space Agency after the FSE session

### Feelings of comfort about discussing space and science

Participants' were also asked how their feelings of comfort when talking about space and science had changed after the session change in participants' feelings of comfort. The majority of participants felt a bit more comfortable (40%) or a lot more comfortable

Table 6 is a heat map which links the change in participants' level of comfort with how they originally felt, and the darker colour is indicative of higher numbers. It can be seen that there is a shift towards the right hand side of the table. In other words, the majority (59.5%) of participants felt more comfortable after the session with 36.5% experiencing no change in their level of comfort and, sadly, 4% feeling a bit more uncomfortable. It would have been helpful to have followed-up with these participants to find out why they felt more uncomfortable, but they did not leave their contact details.

Reported level of comfort before the FSE session	Participants' level of comfort after the session			
	A bit more uncomfortable	No change	A bit more comfortable	A lot more comfortable
Very uncomfortable, n=2	1	1		
A bit uncomfortable, n=8	2	2	4	
Neutral, n=38	2	12	21	3
Mostly comfortable, n=41		17	17	7
Very comfortable, n=27		10	4	13

Table 6: Heat map showing the change of participants' level of comfort as a function of their original level of comfort

### Most memorable points of the session

Participants were asked to write down the three things they found most memorable from the session. The most mentioned themes were *building*, *learning*, and *reading the book*. Some participants also

appreciated the link between the story and the activity, and that the session provided a model for future interactions at home.

*'Building Duplo rockets – great that we are able to do this again at home.'*

*'Learning to build around a story'*

*'Creative ways of using Duplo'*

*'Ideas to use at home when reading.'*

A number of participants commented positively on their child's response to the whole session, and the level of engagement that their child showed.

*'Seeing my child paying attention to the story'*

*'How long my 3 year olds attention span lasted.'*

*'She felt comfortable to join in'*

*'My 2 year old can now count backwards from 5 and I have never heard that before'*

Although the books used were storybooks, 8.5% of the coded responses mentioned learning in some form.

*'Learning about the UK Space Agency informally'*

*'Learning about space concepts in a child friendly way'*

*'Two rovers landed on either side of Mars and were meant to be there for 3 months but are still there 10 years later.'*

A number of parents said that they appreciated having the storybook to take home with them but this was not particularly high in the memorable aspects of the session.

### *Future use*

Participants were asked if they thought that they would re-read the book again with their children. 96% of parents said that they would re-read the book, with the other 4% stating that they were 'not sure'.

### **Longer-term follow up**

A small follow-up telephone survey of a randomly chosen sample of participants was carried out. All of the participants sampled said that they had re-read the book multiple times, including one participant who had answered 'not sure' when asked if they would reread the book again during the session. All participants phoned said that they would be happy to attend a similar science storytime in the future.

*'I think what's good is opening doors to children at a young age on topics that are a little bit more relevant of what they might do in their future lives.'*

Most of the small sample said that the session had helped them to talk about science and space with their child in other contexts, although one commented that it hadn't because she 'already did quite a lot of things at home like that'.

## Appendix 1: Outline of Activity sessions

### Session 1: Are we nearly there yet?

In this 40-minute session EYFS children and their parents shared read the book “Are we nearly there yet?” by Carol Davenport. Following the reading, parents and children are encouraged to use Duplo to build Martian rocks and rovers that might be used when visiting another planet or the far reaches of the solar system.

#### Resources

- Copies of the book ‘Are we nearly there yet?’
- DUPLO boxes (x2)

#### Session plan

Section	Activities and detail
Introduction	<p>Introduce yourself and the project: “Family Space Explorers was developed by NUSTEM at Northumbria University with a grant from the UK Space Agency”</p> <p>Distribute one copies of the book “Are we nearly there yet?” to each family. Explain that the book is now theirs to keep.</p> <p>Read the book to the group. Modelling good shared reading practice by:</p> <ul style="list-style-type: none"> <li>• Asking questions about the images on the page</li> <li>• Asking readers to find things in the picture</li> <li>• Asking readers how character might ‘think’ or ‘feel’ at a given point in the story</li> </ul>
Shared reading	<p>Ask the families to read the story again, this time as family groups. Encourage them to use the shared reading good practice modelled in the first read.</p>
Exploration	<p>There are two boxes of DUPLO – one box is labelled with ‘Diggers/Cars and bits’ and one is not labeled, these should be distributed separately amongst the group. First, use the normal Duplo box to explore building ‘Martian rocks’ using the pictures of Mars as a guide.</p> <p>Ask the families to look at the images of space exploration craft within the book. Tell them they are going to build their own vehicles to explore the surface of Mars.</p> <p>Allow the families time to build.</p>
Plenary	<p>As the families complete the activity, move around each group and ask questions about what is being built and why.</p> <p>Explain to parents that the UK has a space agency – like NASA, and that many of the robots and spacecraft in the book were built with support from the UKSA.</p> <p>The session ends whenever children tire of the activity. Thank all participants.</p>



## Session 2: Goodnight Spaceman

In this 40-minute session EYFS children and their parents shared read the book “Goodnight Spaceman’ by Michelle Robinson and Mick East. Following the reading, parents and children experience what life is like during a spacewalk, by wearing skiing gloves and trying to build using Duplo. Then they build their own rocket ships using craft materials.

### Resources

- Copies of the book “Goodnight Spaceman”
- Skiing gloves (space gloves)
- DUPLO boxes (x1)

### Session plan

Section	Activities and detail
Introduction	<p>Introduce yourself and the project:            “Family Space Explorers was developed by NUSTEM at Northumbria University with a grant from the UK Space Agency”</p> <p>Distribute one copies of the book “Goodnight Spaceman” to each family. Explain that the book is now theirs to keep.</p> <p>Read the book to the group. Modelling good shared reading practice by:</p> <ul style="list-style-type: none"> <li>• Asking questions about the images on the page</li> <li>• Asking readers to find things in the picture</li> <li>• Asking readers how character might ‘think’ or ‘feel’ at a given point in the story</li> </ul>
Shared reading	<p>Ask the families to read the story again, this time as family groups. Encourage them to use the shared reading good practice modelled in the first read.</p>
Exploration	<p>There is one box of DUPLO – the box is not labeled but should be distributed amongst the group when appropriate.</p> <p>Ask the families to look at the images of space rockets craft within the book. Tell them they are going to build their own space rocket to get to the International Space Station.</p> <p>Hand out the “Astronauts Gloves” and ask the children to try building with the Duplo. Show them the image of the astronaut on a spacewalk from the book.</p>
Plenary	<p>As the families complete the activity, move around each group and ask questions about what is being built and why.</p> <p>Explain to parents that the UK has a space agency – like NASA, and that many of the robots and spacecraft in the book were built with support from the UKSA.</p> <p>The session ends whenever children tire of the activity. Thank all participants.</p>

Appendix 2: Space missions named in response to the question 'Do you know the names of any space missions? Please write them in the box'

Space mission	number of mentions
Apollo + Moon landings	50
Tim Peake / ISS	12
Rosetta	6
Beagle	5
Voyager	4
Hubble	3
Mars (no specific name)	3
Mars Rover	3
Cassini	2
Challenger	2
Curiosity	2
Gemini	2
New Horizons	2
Space shuttle	2
Ariane	1
Discovery	1
Huygens	1
Jeff Kennedy Mission	1
Mars Explorer	1
Mercury	1
Philae	1
Principia	1
Saturn	1
Soyuz	1
Space-X	1
Sputnik	1
The one that bounced on the surface and broke	1
The one that the guy from Blue was in	1
TV and Films (Star wars, Starship Troopers)	1
	113

Appendix 3: Key themes (node structure) and incidence of response code arising from the free response text 'What were the three most memorable things about today's session?'

Nodes	incidence
Nodes\\Building	99
Nodes\\Building\\Activity-story link	
Nodes\\Building\\Building Mars	
Nodes\\Building\\Building robots	
Nodes\\Building\\Building rocket	
Nodes\\Building\\Building rocks	
Nodes\\Building\\Building rovers	
Nodes\\Building\\Using duplo	
Nodes\\Child characteristic	11
Nodes\\Child characteristic\\Something new for child	
Nodes\\Conversation	3
Nodes\\Countdown	6
Nodes\\Deliverer Session characteristics	10
Nodes\\distracted	1
Nodes\\Flying space rocket	4
Nodes\\Ideas for home	4
Nodes\\Images on screen	3
Nodes\\ISS	1
Nodes\\Keeping book	9
Nodes\\Learning	37
Nodes\\Learning\\Learning about mars	
Nodes\\Learning\\Learning about robots	
Nodes\\Learning\\Learning about space	
Nodes\\Learning\\Learning about UK Space Agency	
Nodes\\Learning\\Spacesuit details	
Nodes\\Little E	4
Nodes\\Little E\\Female rover	
Nodes\\Negative comments	2
Nodes\\Positive Book	11
Nodes\\Positive Book\\Combined Fiction and non-fiction	
Nodes\\Positive Book\\The story	
Nodes\\Reading book	35
Nodes\\Related activities	4
Nodes\\Time to listen	1
Nodes\\Using gloves	25
Nodes\\Whole session	1