

Great Science Share for Schools Research Evaluation 2019

Prepared for

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1. Introduction

The Great Science Share for Schools was launched as part of the European City of Science in 2016. Since then the initiative has continued to grow in size, importance and overall impact. It was formalized as a trademarked campaign of the University of Manchester in 2018.

The Great Science Share for Schools drew on SEERIH's knowledge gained from their children-to-children's conferences and whilst each year there have been developments, they gained even greater momentum by working in partnership with collaborators and partners such as BASF, Manchester City Council, Siemens, Primary Science Teaching Trust, Primary Science Quality Mark, the Wellcome Trust and the Ogden Trust.

Growth was spurred on significantly in 2018, when GSSfS aligned with the BBC Terrific Scientific Campaign. This saw the central GSSfS event in Manchester on 19 June 2018, in addition to 31 satellite events that took place across the UK, undertaken by schools and STEM education organisations and 251 school-led events, which engaged primary and Key Stage 3 pupils in sharing their science with new audiences.

The 2019 GSSfS has built on the successes of previous years and the flagship event was hosted by the Whitworth Art Gallery on Oxford Road in Manchester. Following the success of the national reach the satellite programme was extended to include all participating schools or organisations undertaking an event, as well as initiating stringer links with University groups and scientists through the #AskAQuestion sub-campaign. There was a significant increase in the number of satellite events, as well as an increased range of organisations and settings being involved across the UK and internationally.

The overall objectives of GSSfS are:

1. To increase engagement of young people asking scientific questions
2. To improve teacher confidence in teaching children to work scientifically
3. To raise the profile and value of school science

The campaign is underpinned by the values of being child-led, inclusive and non-competitive and collaborative

This research project relates exclusively to the GSSfS activity that took place in 2019 and for the first time since its inception, the research was extended to include direct feedback from the pupils involved in the GSSfS, as well as teachers and other education professionals.

2. Research Objectives

To understand what the children who are engaged in GSSfS think about the experience of being part of the campaign. In particular:

- The level of their involvement in asking and investigating scientific questions.
- The novelty of the science questions and investigations they share.
- The impressions they have formed about the event in general.
- Likes and dislikes about the event and run up to the event.
- Post event effects.

To establish the impact the GSSfS has had on pupils' engagement in asking scientific questions. Understanding if the event has had an impact on pupils' achievement in working scientifically and their attitudes to learning science in general.

Ascertaining if teachers believe that engagement in the campaign has resulted in:

- More children being engaged in practical science.
- More children asking their OWN scientific questions.
- More children being confident to talk about their science work with others.
- More teachers feeling confident to involve children in hands-on practical science and to support children to plan and undertake science investigations.
- More teachers willing to support children to ask their OWN scientific questions.
- Increased profile of science in school.
- More people in school involved in science activities

3. Research Methodologies

To this end, **LOOKOUT!**, an independent Market Research & Insights Consultancy based in Manchester, was commissioned to undertake a three stage, research study in order to assess the attainment of the above aims.

Stage One: Qualitative - Pupil Impact (Depth Interviews)

The depth interviews were designed to assess the impact GSSfS has had on pupils' engagement in asking scientific questions. This includes whether GSSfS has had an impact on pupils' achievement in working scientifically and their attitudes to learning science in general.

- 7 x 30 minute telephone depth interviews undertaken between 8th and 17th May 2019
- Respondents were made up of teachers in Greater Manchester who had taken part in the GSSfS at least twice since its inception in 2016. One respondent had taken part in the previous three Great Science Share for Schools events whilst the remainder had been involved in 2 of the last three events.

The Discussion Guide focused on 4 areas of teacher response:

General

- Involvement with the GSSfS over the last 3 years.
- Importance of involvement.

Science Learning

- Impact on children's learning
- Impact on children's ability to ask and investigate their own scientific questions
- Impact on the way children approach different types of scientific enquiry.

Attitudes and aspirations

- Impact on children's attitudes and aspirations towards science.
- Resulting interest in science as a result of GSSfS.
- Long term interest in science.

About you

- Impact on teachers
- Opportunities that have been provided as a result of involvement in GSSfS
- Quantitative impact assessed through a ranking question

Stage Two: Qualitative - Pupil Voice (Focus Groups)

The focus groups were designed to understand what the children who are engaged in the GSSfS Greater Manchester Flagship event think about the experience of being part of the campaign (the planning towards and activity on the day). Also, to understand their engagement in science learning and their attitudes and aspirations towards science.

- 4 x 15 minute focus groups held on Tuesday 18th June at the flagship GSSfS event in Manchester.
- There were 22 participants in total, made up of groups of year 5 and 6 pupils who were representing their schools.

The Discussion Guide focused on 4 areas of pupil response:

Likes and dislikes

- Likes and dislikes of the experience so far. Both in the run up to the event and being at the event.

Science Learning

- Impact on the amount and type of science learning being undertaken
- Confidence in attending the day

Science Aspirations & Attitudes

- Aspirations to do more science back at school, at high school and in future career.
- How the GSSfS will help when back in school.
- Key take outs to pass on to friends and family
- Description of overall experience.

Stage Three: Quantitative – Online National Teacher Survey

The quantitative survey was designed to understand the impact of the GSSfS on the pupils who take part in it, from the viewpoint of the teachers. Investigating pupils' engagement with practical science (as a result of this involvement) as well as evaluating the impact on raising the profile and value of school science.

- An online survey (circa 10 minutes in length), completed by teachers and school representatives who led or were involved in the 2019 GSSfS events campaign wide (UK and Internationally), to assess its impact on pupils' learning
- In total, 155 completed questionnaires were analysed.

The Survey Questionnaire focused on 4 areas of teacher response:

Attendance

- Year and type of participation
- Number of children involved
- Teaching role of participants
- Proportion of children eligible for free school meals

Involvement

- Increase in 'child-led' investigations
- Level of child and teacher input
- Teacher confidence in various aspects of investigations

Impact

- Impact of GSSfS on various aspects of children's learning and enjoyment
- Impact on the school, teachers and children's attainment

Key Findings

1. Executive Summary

As in previous evaluation report (**LOOKOUT!** 2017, 2018), the overarching finding from this report is the positive response from all concerned. The enthusiasm and excitement that the Great Science Share for Schools has generated over the last 4 years continues to grow year-on-year. Any potential concerns of losing the 'specialness', buzz or impact as the initiative grows are so far, very much unfounded.

The core values of the initiative are still very much in place too. Science investigations that are shared at the events continue to be hands-on and child-led and it is repeatedly acknowledged that anything to do with the GSSfS means these values come through much more than when undertaking regular in-school science.

Developments in both how to encourage children to ask scientific questions and how to investigate are real benefits of practical improvements in the amount, types and standard of science being undertaken in primary schools as a result of involvement with the GSSfS. This has had the benefit of supporting pupil's learning helping in science lessons themselves and also across many other areas of study.

Whilst there are many pupil benefits – from science attainment and enthusiasm to overall confidence – it is evident from this year's feedback, more so than in previous years, of the impact the GSSfS has on teachers and on their schools' culture as a whole.

A key focus of this report has been on whether the GSSfS initiative delivers any longevity of impact and the outcomes suggest it certainly does. The findings suggest that access to science and in particular, access to relevant and interesting science means that children are developing a real appetite for more of it because of GSSfS.

Children are seeking out more science when they're immediately back in school and the indication is that this will continue in years to come. Pupils look forward to studying more and involved science at high school and when they get there are more enthused about the subject. They are understanding the much broader implications of science and we've even seen aspirations to move into careers in STEM areas. All of this evidence points to continued and sustained impact.

Even for those children who may not be particularly engaged with school as a whole, hands on science has been suggested to have significantly impacted on these pupils in a hugely positive way. One such example of how science has had a real impact on pupil learning is where a couple of pupils progressed from being disinterested in all school study in year 5 to excelling at science in the early years of high school, beyond that of their peers. Although it cannot be known if this effect was completely attributable to GSSfS, the indications are that it has contributed to this and similar examples like it.

In addition, teachers believe the more they're involved with the GSSfS initiative in subsequent years, the greater the benefits.

One of the most interesting findings this year has been the discussion around attitude and confidence amongst pupils. When attending the event in Manchester, many talked about overcoming nerves or of feeling 'a little scared' but pushing through and doing it anyway. This brings a fantastic feeling of achievement and instills resilience and a real 'can do' attitude moving forward.

The vibe of the event is also worthy of mention. Previous reports have highlighted the buzz, excitement and enthusiasm created by the GSSfS and all of these things remain. What has also come to light though (through the children themselves), is the caring and supportive nature of all who attend. When hosting or visiting stalls, children and teachers alike are warm and passionate about the science investigations they are showing or visiting.

The ethos of inclusivity and lack of competition makes for a supportive and embracing environment, and everyone recognises once again that they are part of something very special when they are involved in the Great Science Share for Schools.

2. Key Findings – Qualitative - Pupil Impact (Depth Interviews)

- The majority of schools gradually increase their involvement with GSSfS year on year as confidence improves and ideas are generated. There is a particular focus on junior pupils (years 5-6) in terms of attendance at the flagship event, with those selected having a keen interest in science and a likelihood to extract the most from the experience.
- The event arms teachers with the ability to put together similar events in their own schools. It also provides innumerable new ideas and inspirations that teachers and children take back to school. In turn, this creates excitement back in the classroom and a real desire to *'do more science'*.
- The Great Science Share for Schools is considered to be hugely important for a variety of reasons: From the confidence it gives children to share science with new audiences, to the improvements that are seen in the way science investigations are undertaken, to the whole school 'buzz' that develops.
- Improvements in scientific knowledge are proving to be beneficial across the whole curriculum. With questions being grounded in purpose and children applying themselves to answering questions in a much more scientific way. There is also greater understanding of when to use different types of science enquiry.
- Pupils are becoming more involved with the investigation decisions - what to investigate, how to investigate and how to measure. Clearly there are several practical limitations to the children being wholly in charge of these decisions but the process seems to be at least a combined teacher / pupil effort.
- Projects in school are becoming more hands-on and practical and children are being encouraged to ask questions.
- The Great Science Share for Schools seems to bring out curiosity and enthusiasm in both teachers and pupils. Children are extremely enthused to learn more about science and there are many reports to suggest that this has continued into high school. Other children have again expressed a keen interest in increasing the amount of science learning and often undertake investigations in their own time.
- Involvement in this project has led teachers to think differently about science and about how this subject can be introduced to children in the classroom. Making teaching and learning more interesting and ultimately generating more engagement, enthusiasm and involvement.

3. Key Findings – Qualitative - Pupil Impact (Focus Groups)

- Pupils find the GSSfS to be an exciting and rewarding event and would very much encourage friends to be part of it.
- It creates a genuine and sincere enthusiasm about science.
- More than this though, is the growth in pupils' confidence that is a by-product of their involvement. Children talk about feeling nervous ('good nervous') beforehand and feeling proud of themselves afterwards. They have to push themselves out of their comfort zone and this encourages feelings of self-belief.
- The GSSfS allows children the freedom and power to try, to make mistakes and to do it again. They're not restricted by thoughts of immediate perfection.
- The event helps children to realise that science incorporates much more than they might have previously thought and that it runs through a multitude of other subject areas.
- The children generally feel that the flagship event will help them when they're back in the classroom - they know more, have lots of ideas and have more confidence – this will help across all subjects and school work.
- The anticipation of science at high school means that children are very much looking to further their science learning. The GSSfS is setting children on a path in which science is embraced and sought out.
- Children and teachers alike can take inspiration and new ideas back to the classroom – furthering the desire to 'do more science'.

4. Key Findings – Quantitative – National Teacher Survey (Online)

- The number of pupils involved from each school depends very much on the type of involvement that school has with the GSSfS. Naturally, attendance is higher where the event is held at their own school – in these cases it is likely that the whole school is involved. For events outside of their own school (hosted at another school or at an event led by a university or STEM organisation), the average attendance per school is around 9 pupils.
- 86% of respondents agreed that the science investigations as part of GSSfS were more child led than those regularly done in school.
- In terms of both the way the science questions were investigated and who raised the question, this was a collaboration between pupil and teacher with a skew towards the children being at the forefront of both aspects.
- The most influential factors on how children asked and investigated their own questions were all concerned with children's' interests, attitudes, skills and confidence around science.
- Confidence amongst teachers is high across the various aspects involved with supporting science investigations. From stimulating question asking to developing questions from the findings – and everything in between.
- Respondents are in strong agreement that the GSSfS impacts the children in a multitude of positive ways. From wanting to do more science in the future, to developing their science skills to learning new things.
- Regards the impact on the school and teachers themselves, again the response is hugely positive. Children are spending more time learning science, more children are asking and investigating their own scientific questions and they're making real progress in science.
- With each year of involvement, the positive impact of GSSfS back at school becomes greater. 62% of respondents agreed with this sentiment. Of those who didn't agree, 37% answered with 'I don't know' which corresponds with a large number of respondents not having been involved in previous years.

5. Key Findings - Common Themes (across all methodologies)

All of the key objectives for which the GSSfS strive are reiterated across the three aspects of this study. Response across the various methodologies is very consistent and overall the key findings suggest:

- Enthusiasm, excitement and interest in learning science as a subject.
- Children being encouraged to lead, choose and be at the forefront of science investigations.
- A desire to 'do more science'.
- Improved standards of science questions and answers.
- General confidence building – of science specifically but also as a life skill. And in addition, a realisation that 'science is everywhere' in our lives.
- Confidence building and network generation for teachers.
- Pupils are learning an appreciation that science is more than just the investigations they do in class.

Results and Analysis

This part of the report is split into 3 sections, covering the 3 stages outlined above:

- 1. Pupil Impact (Depth Interviews)**
 - 2. Pupil Voice (Focus Groups)**
 - 3. National Teacher Survey (Online)**
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1. Pupil Impact (Depth Interviews)

1.1 Involvement

The aim this year was to talk to participants who had been involved in the GSSfS initiative for two or more years, in an effort to understand the longer term impact that the Great Science Share for Schools creates. Naturally then, our interviewees had had significant involvement in the GSSfS events.

The normal pattern seems to be that first year involvement is relatively small, with a handful of students being taken along to the main GSSfS event. Year on year, this number increases, though only to a maximum of around 12-15 students. More than this becomes logistically unmanageable but also takes away from the 'specialness' of the event.

There is a pattern in terms of attendees in that years 5 and 6 (upper Key Stage 2) are the usual choices, with less regular attendance of years 3 and 4 (lower Key Stage 2).

Within these year groups, children are selected to attend the main event generally based on a keen interest in or talent for science. It's also important that children who attend are able, confident and enthusiastic enough to 'get stuck in' and to be able to relate the experience back to the whole school. In some instances, schools have 'science ambassadors' who run or attend science clubs and science events. Where these are in existence, they are naturally first in line for attendance at the Great Science Share for Schools. One interviewee suggested that the sign up for science ambassadors was always boosted by the fact that they would get to go to the Great Science Share for Schools. In a similar vein, other schools have an Engineering Club and again this can lead to being chosen to attend the main event.

The reasons given for this selection process was generally that these children would get the most out of the Great Science Share for Schools. They're not necessarily the children who are the brightest or achieve the best test scores, it's their desire or curiosity for science that encourages nurturing and support.

In terms of what they actually took part in, again there is a significant pattern. Most said that they attended the main event in their first year, but then took the GSSfS back to school

by creating almost a mini version in the school hall or playground. They would set up stalls as per the main event and invite parents and other classes to attend and interact. In some cases, this happened right from the beginning, in others, the 'back at school event' began in the second year of involvement. It was mentioned that going forward, it would not be completely necessary to attend the main event at all.

Teachers have been armed with resources and experience to take the Great Science Share for Schools format and run this as a whole school event - with a keen focus on child led techniques and quality questioning.

Naturally, many more pupils are able to get involved and this has the added benefit of freeing up the opportunity of the main event for newer participants to develop the same skills.

1.2 Importance of involvement

Being involved in the GSSfS is very important to all those interviewed, who suggest that:

- It encourages children to be interested in and motivated about science.
- It helps to encourage parents to be involved – being invited into school to engage and share in the children's new found experiences.
- It demonstrates to children what they can achieve if they put their mind to it.
- It helps to further the science agenda and raises the profile of science in school.
- The children enjoy being able to lead in the sharing of investigations.
- Teachers and children are introduced to new ideas to take back to school and to put those into practice.
 - *"I saw things I'd never thought of, so I took those ideas back to school and used them in class."*
- It creates a 'buzz' around the whole school.
- Science enquiries are much richer as a result of attending the GSSfS.
- It means that more children are doing more investigations – often unprompted!
 - *"Some of the kids have been carrying out explorations at home and bringing them into class - such is their new enthusiasm for the subject!"*
- It allows children and teachers to be more curious and to follow up that curiosity.
- It illustrates 'best practice' science.
- It shows science in context and demonstrates that science is much more than children would ordinarily have thought, is everywhere and relevant to everything.
- It feels good to be part of something bigger. It's impressive and exciting.
- It empowers children and helps them grow their confidence and overcome fears.
- Science back in the classroom becomes more effective.

1.3 Science Learning

All those we spoke to suggested that there was a definite increase in the scientific knowledge of the children who had been involved with the Great Science Share for Schools. This is seen across the curriculum and not just within the science projects that take place. Children are understanding that science exists outside of a lab and as such are using science knowledge, questioning skills and investigative skills in many other areas of learning:

- It's reported that children are asking better scientific questions and questions with stronger purpose. Better science questions lead to better investigations and this questioning is showing benefits across all areas of study – from music to mathematics.
- Also, the children apply themselves to answering the questions in a much more scientific way, shown through the way their problem solving skills are evolving and improving and their minds are opening up to suggest different types of investigations.
- Children are much more aware of the science that is all around and it is becoming part of everyday life. Science is real life, it's not just a technician in a lab coat with a Bunsen burner.

The GSSfS is also impacting how the curriculum is interpreted back at school. As a result of being part of the Great Science Share for Schools, some teachers report having included much more exploratory science and child led investigations back in the classroom. One teacher reported; *"it's helped us to tailor a really cool curriculum that the kids are actually excited about. It's developing a legacy of learning – younger years are excited to think that they'll be learning that soon too."*

And then of course, as has been reported before, the Great Science Share for Schools helps children to develop a real confidence in themselves. They're allowed to make mistakes and to try again and find other ways, so they're happier to have a go and to try. They're tasked to push themselves and demonstrate their investigations to other children and visitors to the event and they benefit from this challenge. As one teacher commented,

"You can see them grow through the day when they're explaining. They grow in confidence and believe that they're good at science".

It brings out a renewed curiosity in teachers and children alike and right across the school. It's not just the children attending the main event who benefit. Learning is taken back into class and into assembly and into their own events and the whole school shares a focus and enthusiasm for learning about science.

The scientific tools or methods that are being developed from being involved in the GSSfS seem to allow children to learn without realising they're learning. As one teacher called it - *"sneaky teaching!"*

1.4 Science Investigation Development

The choice of which science investigation and method to use seems to be a joint decision between teachers and children. In many cases, the teachers take into account time, resources and the theme of the Great Science Share for Schools to develop a series of potential options. From there, the final decision is down to the children. Where exactly to carry this out is led by the teachers and again this is down to assessment of resources and logistics. However, most other decisions are at least in some way, led by the children. Most said that they prefer the pupils to take the lead but there are naturally occasions where this needs to be guided.

One approach to encourage children to work things out for themselves was a 'question credit' bank. Each child had a set of credits to use - each credit enabled them to ask the teacher a question. When they ran out, they couldn't ask anything else. This encouraged the children to only ask questions after they'd tried to think things through or work out possibilities and ideas of their own.

The involvement that children have in these decisions is clearly beneficial in itself. Pupils discuss the merits of measuring and recording investigations as a matter of course and debate why one method may or may not work better than another, until a joint conclusion is reached. It's felt that it's essential that children make their own decisions and be allowed to make their own mistakes.

It was mentioned several times that involvement with the GSSfS ran in conjunction with an Engineering Challenge project that was being undertaken at the same time. This therefore skewed the type of investigations that were chosen.

In addition, the Primary School Quality Mark (PSQM) was referenced, with the GSSfS being clearly seen as a hugely positive campaign that brings external recognition.

The process of being involved in the Great Science Share for Schools has very much impacted on the ability of children to ask and investigate their own scientific questions. Projects are typically hands on and practical and naturally evolve as they go along - with the children involved in all elements of the enquiry. They are encouraged to pose their own scientific questions, both in terms of which big question to investigate and then how to evaluate it. Both of these skills are improved the more they're put into practice.

A couple of teachers mentioned the introduction of a science 'question board'. Children are constantly encouraged to ask questions about science, though sometimes these questions come to mind at a slightly inconvenient time. The 'question board' offers an opportunity to post any and all questions so that they don't get missed or forgotten. If a question can't be discussed there and then, it's written up on a post it note and posted on the question board. These questions are then dealt with at a specific time in the week. Discussing how and why the question was posed, where an investigation should take place, what type of investigation or enquiry should be used to answer it and what variables should be measured.

Where the question board doesn't exist, these processes are talked about in other ways. Encouraging children to determine which science enquiries are most appropriate for which questions. Also, if they want to change one thing about an investigation, what do they have to control, ask and put into place?

The children definitely have more confidence to ask and investigate their own scientific questions and indeed to make their own decisions without fear of failure.

As well as being able to ask the right question, the children are also much more switched on to how, when and why to use different types of science enquiry. By asking better questions, these are the start of a thought process which leads to a better understanding of why different enquiries work in different situations and why some routes wouldn't work.

The GSSfS has '*opened kids' eyes*' to the different types of investigations that can take place.

"We start with a 'hook' as we come into each unit. These are explored in detail and questions are generated from there. They understand which enquiry to use and the approach is very hands on."

1.5 Attitudes and Aspirations

The GSSfS is said to absolutely have a strong impact on children's attitudes, identity and aspirations towards science. Both as a subject to study in later years and as a career path even further down the line. Several teachers mentioned that high school peers have fed back that they '*know which kids have come from your school*' because of their huge enthusiasm for the Sciences.

It's interesting to note that everyone reports how it quickly becomes very acceptable that science is all around and is part of everyday life. The normalising of science rather than allowing it to be seen as a very discreet subject goes a long way to encouraging involvement. The children tend to be amazed at first that '*that's science...and that's science...and that's science*'. There are lots of children who previously hadn't realised the breadth of science and therefore the numerous careers that are based in this subject.

*"Loads of the kids want to be scientists after the Great Science Share for Schools."
"Even months later the kids are excited."*

It seems the legacy of the Great Science Share for Schools means that children are excited even before they've had first hand involvement. There are several mentions that younger years '*can't wait*' to get to year 5 or year 6 because they see what's waiting for them in terms of the GSSfS and the science lessons that follow. There is a definite legacy of enthusiasm, interest and excitement which can be attributed not just to experiences at the event but to the experience and resource that teachers take back to the classroom.

One report tells of a couple of children who were not really excelling at anything and not too interested in school. They were chosen to attend the GSSfS event because of this and because they showed a slight interest in the subject. The event opened their eyes to the possibilities of science and both children decided they wanted to take science further – setting up their own STEM club at lunchtime. The teacher helped them out with books of experiments and various resources but the children themselves ran the club to encourage others into science – on their own initiative and because of their new found love of the subject. They've since gone up into high school and are continuing their involvement in science and by all accounts are *'excelling beyond their peers'*.

In other instances, it's noted that science used to elicit a response of *'ugggh, science'* but now is met with *'ooooooh, yeah science'*.

1.6 Teacher impact

Interviewees were very clear about the personal benefit of their involvement with the GSSfS.

The sharing of ideas is invaluable. Everyone talked about finding new and inspiring ideas at the main event; from which investigations to run, to how to put things into practice, to how to integrate science with other areas.

It's helped to develop science learning in schools and to put best practice into place. There are learnings of how to develop science in the classroom in new and exciting ways and how to ensure that quality science with quality questioning is taught. It has changed the way that teachers think about teaching a science class in a way that makes children look forward to Key Stage 2 because they'll *'get to do science'*.

The enthusiasm and inspiration that is generated through the event is huge. For many it generates an excitement about science across the whole school and encourages a real passion for the subject. For those who have a background in science it renews the excitement and for those who may have overlooked science before, it very quickly ensures new fans.

It has had a positive effect on many teachers personal progression and recognition. It's opened up opportunities to share knowledge and has generated the most relevant networking situations. Many reported the impact of the GSSfS on CPD achievements and the link with achieving the PSQM.

The links that have been opened up to resources and to training and conferences again are very much valued.

1.7 Ranked Impact

We asked teachers to rank the impact that the Great Science Share for Schools has had on various factors and the feedback is shown here.

Statement	Average Impact Ranking (0 = none; 5 = high)
Your (teacher) knowledge and understanding about asking scientific questions	3.3
The profile of science questions in your school	4.4
The opportunities for children to ask their own scientific questions in your classroom	4.6
The engagement of parents / community with science in your school	4.0
Children's science attainment	3.8
Children's aspirations towards science	4.4

- **Your knowledge and understanding about asking scientific questions: (Score of 3.3)**

Many teachers had a strong understanding and knowledge of science anyway. It was felt that involvement in the GSSfS has helped to refine questions and to improve the type of questions that are asked.

- **The profile of science questions in your school: (Score of 4.4)**

Involvement with the GSSfS reinforces and improves scientific enquiry and it helps teachers and pupils to use the right vocabulary and to ask the right questions. It serves as a great reminder for everyone and ensures that teachers think carefully about the questions they're setting. Where questions may not have been worded quite correctly in the past, there is far more focus on ensuring that this is performed to best practice.

- **The opportunities for pupils to ask their own scientific questions in the classroom: (Score of 4.6)**

The GSSfS approach ensures that the majority of decisions and questions are coming from the children. They're allowed the opportunity to do it for themselves, even if they make mistakes along the way. Teachers are almost forced to step back and let the process naturally develop. It opens the door to more creativity. The teacher's role is then to push at this and ask, '*what else could we do?*' and to nurture the children through the process.

- **The engagement of parents/community with science in your school: (Score of 4)**

Many said that the GSSfS very much helps encourage external engagement. Parents are regularly invited in to the Great Science Share for Schools' activities that take place in school – as both volunteers (to talk about their own careers) or as visitors to table top investigations.

At the same time though, most recognise that much more can be done in this area and also in terms of communicating with parents and the community about what's being done around the areas of STEM and in particular science.

- **Children's science attainment: (Score of 3.8)**

This area is discussed above. The term 'attainment' is one relating specifically to marks and assessment levels which is a broad issue in primary science; notably all of those interviewed agreed that pupil achievement was evident in terms of the raised enthusiasm and improved attitude and engagement, which means that they ultimately do better. They're always honing and refining and this in turn, improves their skills.

- **Children's aspirations towards science: (Score of 4.4)**

Again, this is detailed above but all were in agreement that involvement with the GSSfS leads to many children wanting to pursue science as a subject or aspiring to eventually have a career that involved science.

1.8 Other thoughts

The final question was to ask teachers for any other thoughts on the GSSfS that hadn't been covered already in the discussion. Without fail, all respondents talked about how fantastic they considered the GSSfS to be.

As in previous years findings, all found it to be an inspiring event, creating a fantastic opportunity for teachers and children alike.

"I've really enjoyed being part of it and the kids have got loads from it. We've improved and grown our involvement each year."

"It's given me confidence to develop my science skills so that I can in turn develop the skills of other staff members and pupils."

A key barrier to attendance at the main event is the logistics involved with getting there. However, with other options available of creating a satellite event or putting together something bigger than usual at the school, this wasn't seen to be a major issue. Now that teachers have the experience of the GSSfS and access to relevant resources, many are happy to take their learnings and develop their own whole-school events. It could be considered whether there could be more done to link this back to the main event, beyond the existing use of the 'live' streaming and branded resources?

One of the reasons people value attending the flagship event is the sense of being part of something big and being recognised for being part of it. The fact that certificates are given out to attendees was a really big deal to the children that went along. This supports the need for ongoing publication of a branded annual participation certificate that is available to download online, as is currently provided by the GSSfS development team.

There was also advice for other schools who haven't yet been involved:

"As a campaign and a way into science, if they're trying to build profile and build an interest in science within the local community, this is definitely something they should be involved in."

The Great Science Share for Schools is something that they all look forward to and children and teachers alike return to school happy and enthused.

2. Pupil Voice (Focus Groups)

At the flagship event on Tuesday 18th June, in a breakout zone of the Great Science Share for Schools, we carried out four short, fast paced focus groups with visiting school children. There were some limitations to the group sizes due to the time available and the actual numbers of available respondents in some of the groups. However, the majority of participants were chatty, enthusiastic and willing to share their experiences of this year's GSSfS.

2.1 Likes and Dislikes

All of the children said that being at the GSSfS event was exciting... although a little bit nerve racking. Everyone spoken to was very enthused and loved being at the event. There is a long run up to the day with lots of planning and prepping and once they were finally there it seemed to be a lot to take in. They suggested they '*sort of*' knew what to expect but '*not really*' - as it was so unlike anything they had done before.

All of the children said that they really wanted to make a good impression - of themselves, of the school and of the stand they were representing. They wanted to ensure as many people as possible went to look at their investigation and they wanted to execute it perfectly.

The nerves element stemmed from this. Children were concerned about - What would happen if it went wrong? What would people think? In reality, nerves were dissipated very quickly as everyone was kind, enthusiastic and respectful about each other's experiments. The anticipation was much scarier than the reality and all said that they were enjoying it very much.

Some suggested that they didn't know how much talking to do – not too much, not too little. It should be just right.

Having people test the experiments that they've worked on for so long was a fantastic experience for the children and they enjoyed seeing visitors' reactions. They understood that they were taking part in something big and that it's a special thing to be part of.

A large majority of children said that the best thing about the experience was seeing what everyone else had put together and being able to take ideas away to use back at school. They invariably enjoyed hosting the stand itself and seeing the reaction that these investigations generated. In particular, being very pleasantly surprised as to the way these were received.

Other highlights included all of the extra science that they've been doing at school and in preparation for the day. Most said that they already learned about science in the classroom but the GSSfS meant that they've been doing a lot more. It also inspires the children to want to do even more still.

One pupil suggested that they learn much more by being out of the classroom. Another said that it was great that they were *'getting to miss the boring stuff at school!'*.

Involvement in the preparation for the day has led many to realise that science is all around and that science is part of many other subjects. This in itself was a key benefit to several of the children. *"I like that other subjects are science too. Like, art is science. We made a volcano so that's art and it's science."*

The dance was mentioned by a couple of children as something they particularly enjoyed, and many were looking forward to watching the GSSfS film that had been put together. The Great Science Share for Schools song also had a mention – specifically that it's a known song with its own interpretation - *"it's funny to hear a song that exists but has words added"*.

There were no negatives at all about being involved with the Great Science Share for Schools. Either before the event or at the event. The only issue that came up from some was around the *'boring'* bus journey! All were incredibly happy to be there and to be involved.

When we asked what the children might tell friends and family about the experience, they would encourage everyone to try to experience it for themselves:

- *"They should beg that we do this next year."*
- *"It's really good."*
- *"I'm going to ask parents to do more science."*
- *"It's been really exciting."*
- *"I'd recommend the art gallery"*
- *"I'd recommend them to do it if you're a bit shy as it boosts your confidence."*
- *"How much fun it's been."*
- *"All the amazing facts we've learnt."*
- *"What a brilliant experience it was."*

2.2 Science Learning

All of the children said that they have been doing more science recently and most agreed that they've been doing more actual investigations and being more hands on. They were asked about who it was that decides which experiments to carry out in the classroom and whilst the children have some input, it's the teachers who plan and decide what to do each week. The children would like more input into these decisions but naturally this will come down to available resources and other practicalities. One child did say that the teacher sometimes says they can do an experiment of their choosing, but that it rarely happens.

The children definitely find the event gives a real confidence boost. Interacting with other people whilst hosting their own stand gives them a real sense of pride and *'I can do this'*. Many reported feeling nervous beforehand but really enjoying it and feeling great afterwards. They reported feeling much more confident about talking to people about science in the future, knowing that they can do it.

2.3 Science Aspirations & Attitudes

The Great Science Share for Schools undoubtedly creates a desire to do more science. All of the pupils suggested they were keen to do even more science when they got back to school and in the coming weeks. They had their eyes opened to numerous examples of exciting experiments that they could try out and they were incredibly keen to work through these. They talked about doing more science in school with the teacher but also undertaking their own investigations at home with parents.

One child went so far as to say that they had believed *'science to be boring until they became part of the science share'*.

Whilst part of this enthusiasm comes from the exciting parts of science, part of it also comes from the boost in confidence that they now have. They realise that it's not the end of the world to make mistakes, they're *'allowed'* to and this frees them up to be able to try to things out.

Interestingly, it was mentioned that the *'Science Share makes teachers themselves do more science'* – which in turn benefits the children.

Looking ahead to high school and the children are excited for science learning there too. There is a popular believe that *"the experiments are even better at high school because you can use different equipment...and fire"*, so it's even more interesting for them. Also, in high school, *"you get little science bottles that you see in cartoons"*- there is significant expectation about what secondary school science is like!

The fact that science is a core subject at secondary school is important to them – it becomes a more regular and focused part of the curriculum and something they're very much looking forward to.

When we asked the children about the longer term future, it becomes a little more difficult to imagine. There were a large number of budding footballers and rugby players (as you might imagine amongst ten year olds) and the desire to do this professionally is something that science will need to compete with!

What did come through was the understanding that science is part of many more career paths than they might have imagined. They talked about different subjects working together and how science is included where you may not have previously believed it to be. Examples given were; building a working volcano in art and baking cookies at home. About half of the groups stated preferred careers that predominantly included sciences – a vet and a doctor being amongst them.

When we asked about how the GSSfS will help pupils when they're back in the classroom they were all in agreement; they know more now, they're more confident and they have more ideas.

The children reiterated that science will help them in all subjects. They related science to a range of subjects where it would help them to make sense of things – the environment and recycling for example.

The final question was to ask the participants to describe the overall experience with one word. This was the trickiest question for everyone, but they took their time and gave us the following:

Amazing
Breathhtaking
Scientific Fun Great
Outstanding
Exciting Inspirational
Fascinating
Inclusive Thrilling
Enjoyable Proud
Inspiring
Nerve-Racking
Extraordinary

The children were quite clearly working through their internal thesaurus to suggest words which demonstrated how special the event had been to them.

In summary, this appears to be a highly productive experience for all of the children involved. They come out of the experience feeling that they know more and they have a desire to know *even* more. They're more switched on to science than ever before and they develop a real confidence and belief in themselves.

3. National Teacher Survey (Online)

3.1 Attendance

The teacher survey was completed by 155 respondents between Tuesday 18th June and Sunday 11th August.

Of those who responded, 72% were general or science teachers:

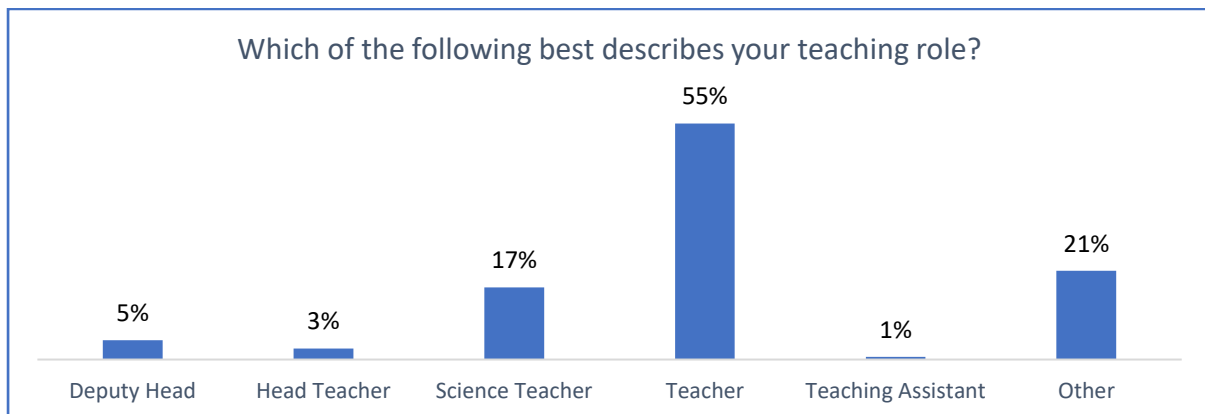


Figure 1.

'Other' included a number of science co-ordinators, facilitators or leads. In addition we heard from; a transition co-ordinator, a forest school leader, a home educator, a lead practitioner for early years, a university outreach officer, a PhD student and a number of respondents who held multiple roles. For example 'teacher *and* science lead'.

The schools of those who participated in the survey have a skew towards a higher percentage of free school meals than the national average of 14%.

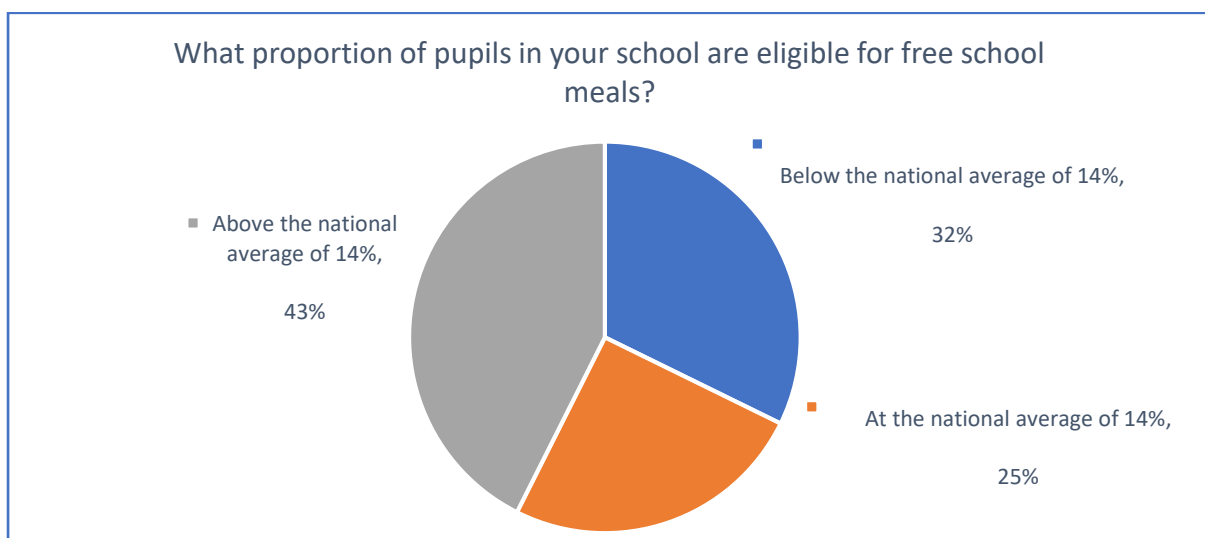


Figure 2.

The large majority of respondents were not involved with the GSSfS in years prior to 2019. The further back we look, the less likely they were to have participated.

In this current year of 2019 activity, 56% hosted their own event whilst the remainder attended an event elsewhere. As well as seeing a growth in overall participation, there is a clear trend towards participants hosting their own, in-school events.

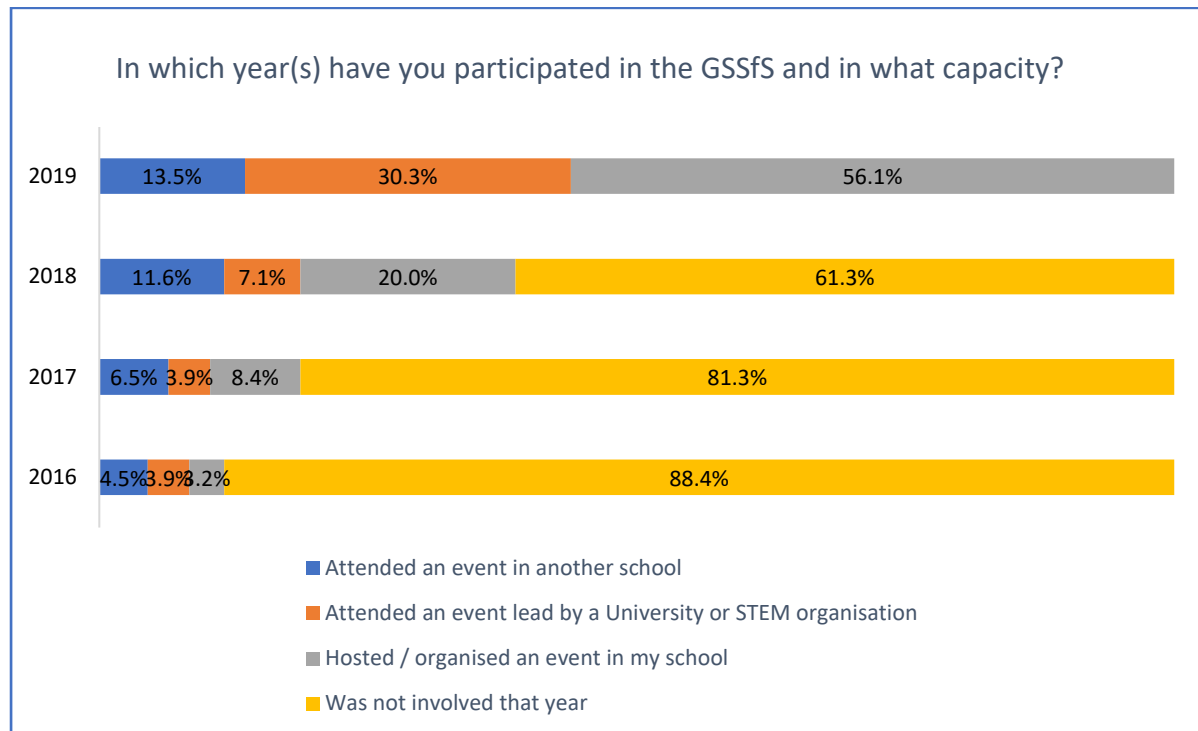


Figure 3.

Thinking specifically about the 2019 activity and the number of respondents who were involved from each school, this varies considerably depending on the type of involvement.

- Of those who **hosted or organised their own event, in their own school** (56% of respondents), the average number of respondents per school was 191. Involvement ranged hugely however from just 3 to 600.
- Of those who **attended an event at another school** (14%), the overall average number of those involved per school was 25. However, this count includes one response of 0 and one response of 350. 19 of the 21 responses (or 90%) were in the range of 4-14. The average of this count is attendance per school of 9.
- And of those who **attended an event lead by a university or STEM organisation** (30%), the overall average was attendance of 69. Again, we can see that the majority of respondents said that the attendance per school was between 5-16 (83%) and the average of these responses is again 9. Outside of this range there were 8 responses; 40, 93, 210, 270, 400, 450, 720, 720.

It makes sense that the number of children in attendance is significantly higher when the event is held at their own school. Here it would seem that the whole pupil body can be involved without the issues of travel and logistics.

For events outside of the school, excluding ‘extreme responses’, the average attendance is around 9 pupils per school. This also corresponds to findings from other methodologies within this report.

3.2 Involvement

The large majority of respondents (86%) stated that the science investigations that took place as part of the GSSfS were more child led than those regularly carried out in school. 47% said that these were ‘a great deal more’ child led than usual.

As this is a core element of the GSSfS objective, it is heartening to see such strong figures. Responses stating that the investigations were the ‘same as usual’ could be interpreted in a number of ways;

- Either regular in-school investigations are already very much child led,
- Or, there is work to be done to encourage this element in future activity.

As we’ve seen earlier in this report, feedback from the Pupil Impact Depth Interviews suggests that whilst a fully child-led approach is the optimum, there are practicalities involved which may mean that this is not always possible, or in fact something that educators and teachers would always advocate for.

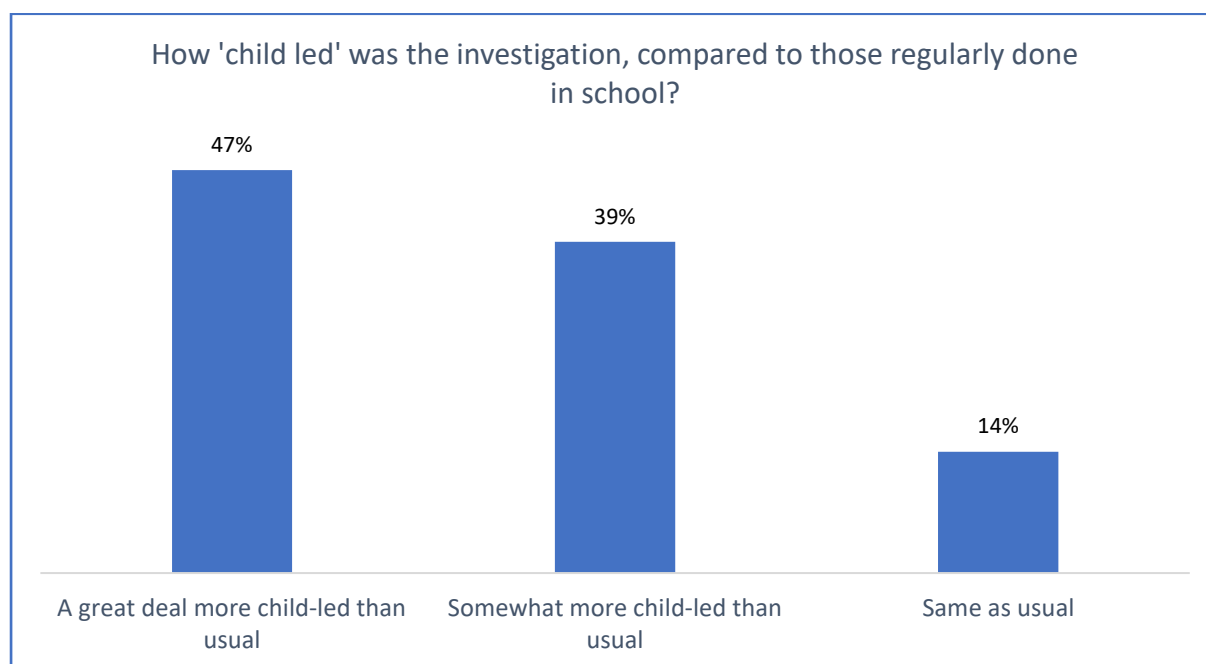


Figure 4.

It is clear that the way a scientific question was investigated and where the question originated from is very much a collaboration between pupils and teachers and there is a definite skew towards the children leading these aspects.

Whilst the overall response to this question was positive, with a view to always improving, it is worth noting the 5% of responses which suggest that neither the question nor the type of investigation was chosen at all by the children.

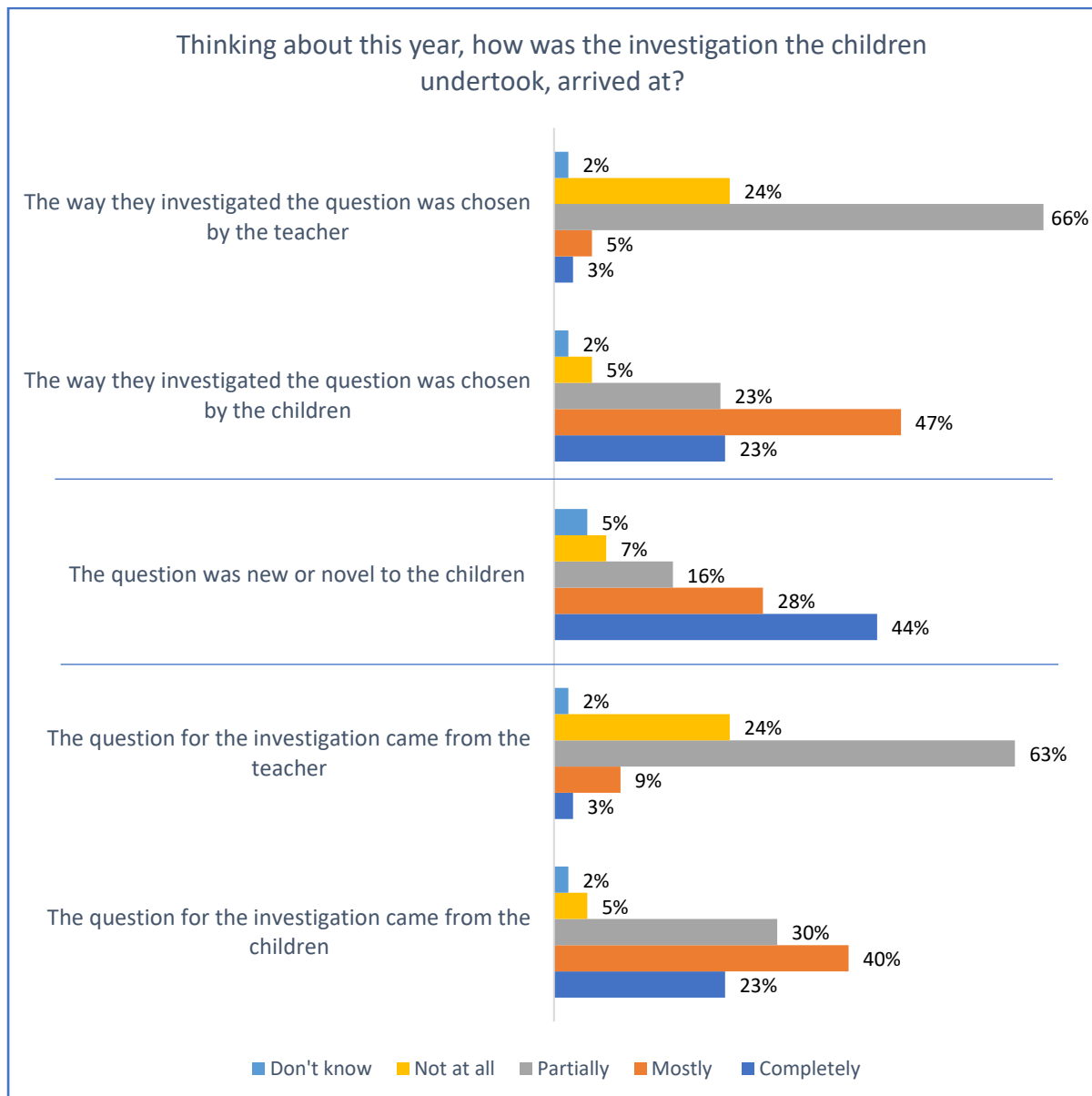


Figure 5.

The most influential factor regarding how children asked and investigated their own scientific questions was the children’s interests and attitudes towards learning science. Followed by the children’s’ skills and then their confidence in science.

Teachers are clearly assessing the needs and abilities of their pupils' with a view to running the most relevant investigations.

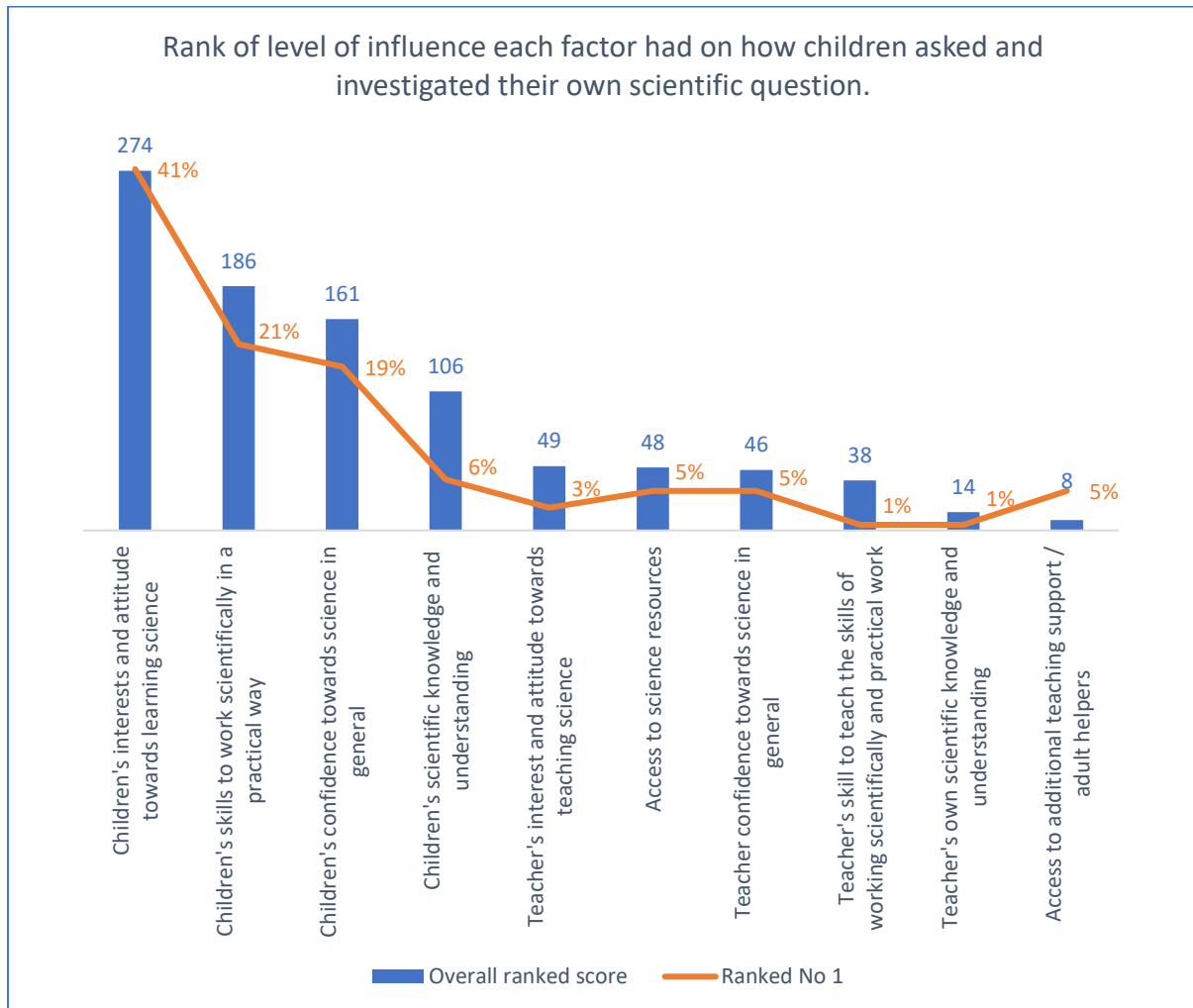


Figure 6.

(Bar shows overall ranked score where 1st rank = score of 3, 2nd rank = score of 2, 3rd rank = score of 1. Each score is collated to give the above overall score. The line shows % of respondents scored that factor as 1st rank (most important).)

When we asked about confidence levels in the teachers themselves, across various elements of the investigations, this was generally high.

Whilst there were a very small number of respondents who answered that they were not confident about individual elements, no-one answered 'not very confident' to all questions. 28 respondents answered 'completely confident' to all questions.

(Two respondents answered 'don't know' to all questions. One respondent answered, 'not applicable' to all questions and another to all except 'doing the investigation'.)

Doing the investigation itself elicited the most confidence whilst it was the 'before and after' where this fell slightly. Perhaps more could be done to support these areas.

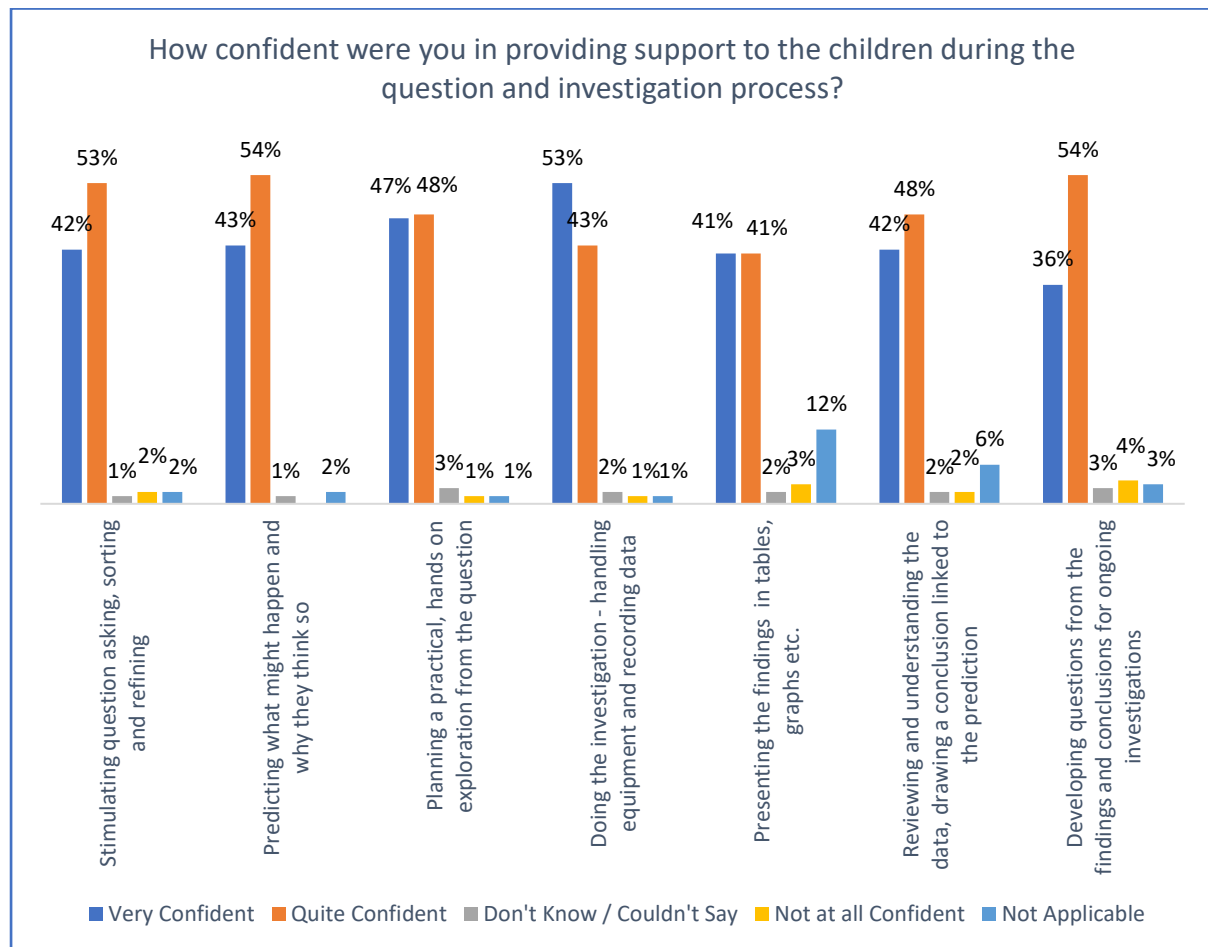


Figure 7.

3.3 Impact

To varying degrees, the majority of respondents are in strong agreement that the GSSfS impacts the children in a positive way.

94% said that they strongly agree that the children enjoyed the experience, and no-one rated any aspect of this question below 'agree'. This was overall the most positive response.

That the children learnt new things was the second most positive response with 99% agreeing or strongly agreeing. Closely followed by; children developing their skills in doing science, again with an overall 99% positive response.

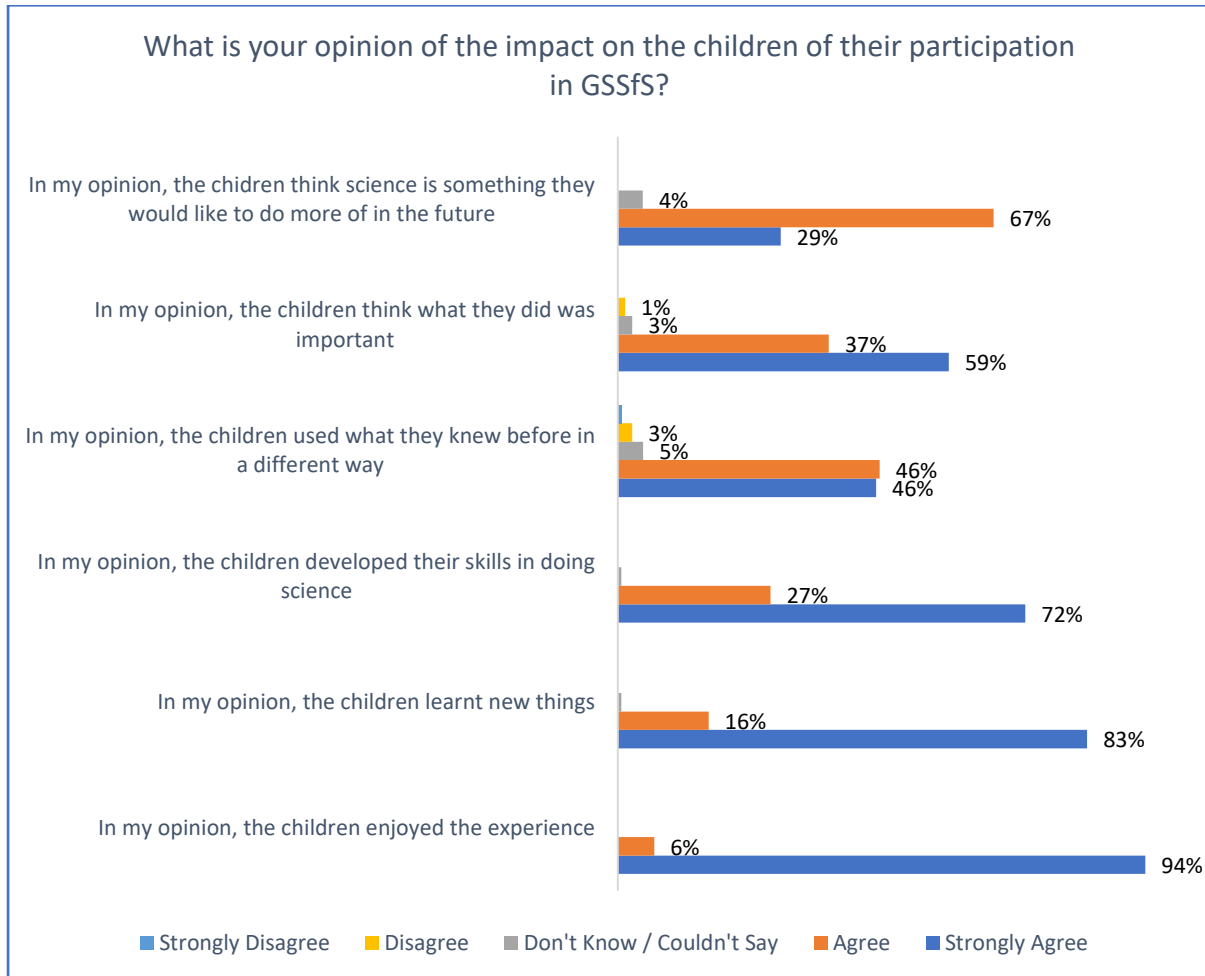


Figure 8.

Involvement with the GSSfs has had a significantly positive impact on the large majority of respondents. The survey saw positive answers across all questions here.

Of particular note, 19% strongly agreed and 43% agreed that with each year of involvement, the positive impact of GSSfs back at school becomes greater – illustrating the longer term benefits of being part of the initiative.

The strongest positive response was around the increase of the profile of science in school. 52% strongly agreed with this.

Some of the questions which saw an answer of ‘disagree’ could again be interpreted differently. For the first three statements here, the negative response could be because there is already a lot of this happening, or it could be that there is significant room for improvement. These findings would benefit from further exploration.

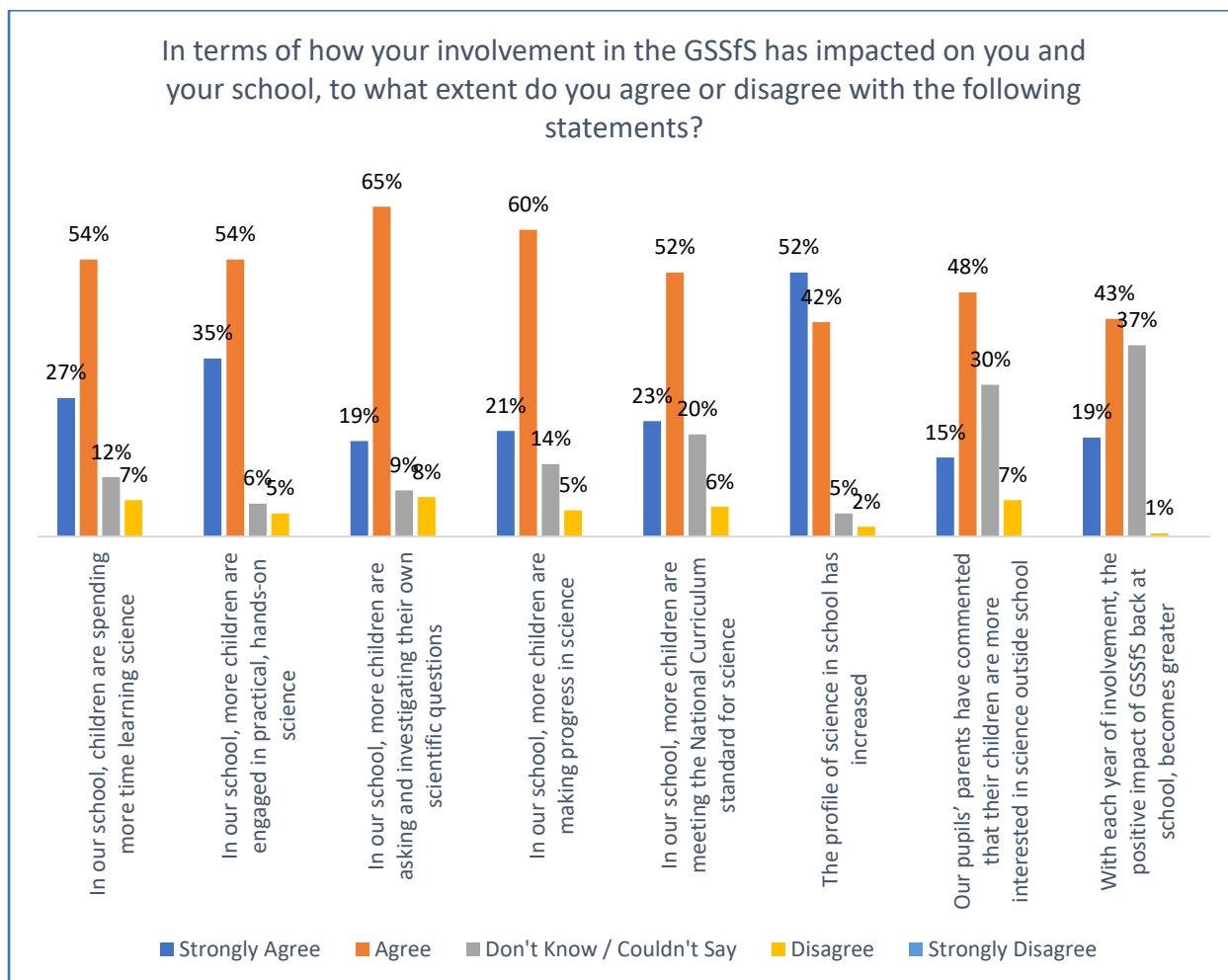


Figure 9.

The results of all elements of this study are extremely positive, with impact on pupils and schools being significant.

These findings from teachers nationally go a long way to backing up the qualitative findings of both the Pupil Impact Depth Interviews and Pupil Focus Groups which indicate that the GSSfS is of major benefit to all aspects of science learning.

If we look to where improvements can be made, breaking down the undertaking of a science investigation is useful. We can see that the actual 'doing the investigation' is where respondents are most confident. It seems to be the stages before and after the investigation where it may be useful to provide advice, support and best practice ideas. For example, when 'reviewing and understanding data and drawing conclusions', 10% of respondents suggested that they were less than confident with this.

This section also raises some questions about the child-led approach of a minority of respondents. We've seen that a small minority are seemingly not giving as much focus here as might be preferred - whether due to resource, time or other issues. We have heard that teachers first take into account the ability and interest of the children, so it's possible that the reason for more teacher involvement is as a result of this.

4. Conclusions and Recommendations

Whole School Involvement

The Great Science Share for Schools is giving pupils a focus and desire to learn. It's creating an enthusiasm and curiosity that is being taken through the final years of primary school and into high school and beyond. Any way in which this can be extended to more of the school cohort can only be a good thing and one way to do this is to encourage in-school events where far more students can attend.

This gives another level of positivity to the findings that several respondents from the telephone interviews suggested that once they've attended an event, they feel that they have the confidence and skills to host their own. This confidence then means that the whole school will further reap the benefits of involvement in the GSSfS.

Sharing

The GSSfS has created a place where science ideas can be shared and where inspiration can be found. Both teachers and children have reported finding ideas for science questions and investigations and different ways in which to carry out the investigations.

There are also a number of interesting ideas and tips and tools that teachers have talked about in the writing of this report. Things that are used in the classroom to encourage the right type of questioning for example.

Perhaps the opportunity to encourage sharing beyond the day of the event into an online hub to encourage this exchange of ideas and even fears and frustrations. A safe and supportive place to extend the protected feeling of the actual event. Notably this was offered by a few organisers after their 2019 events and are hosted on the main website. This could potentially be further developed as legacy resource.

Bespoke Needs

Findings that indicate that teachers are assessing pupils interest and skills in science before they decide upon science questions and types of investigation are very encouraging. It's important that each pupil cohort is treated individually to ensure that they get the very best from their involvement.

Whilst it's a key value that science investigations are child-led within this campaign, there is an accepted understanding that there is often a requirement for teachers to determine direction and give input where necessary – this is indicative of their role in ensuring the curriculum is addressed in breadth and depth. This varies from group to group and it seems that teachers are open to bending the framework to again allow the best for the children.

4. Conclusions and Recommendations (cont'd)

Extending the focus on being child-led

When it comes to being child-led and hands-on, it does seem that perhaps teachers should be encouraged to keep up the focus on this right through the year, rather than just in the run up to the GSSfS. Teachers and children fed back that investigations were more likely to be led by the children as the event drew near. This practice could be extended into all areas of science to become the norm – given the benefits that have been exemplified in this report and others.

Teacher Confidence

Confidence amongst teachers in all areas of undertaking investigations seems to be high, which indicates that there are large numbers of teachers working in primary schools who are relevantly skilled in the sciences. This confidence could also point to the support and help given by the GSSfS to all of those involved. However, we have seen that perhaps that more could be done regards advice and best practice around the elements that precede and the actual 'doing' the science investigation and after it has been completed.

Longevity of Impact

There has been a long standing belief that regular involvement with the GSSfS delivers increasing value and sustained impact and this evaluation report confirms that this is the case.

5. Overall Insights

- In many cases, the children who attend the GSSfS haven't been involved in anything similar before. Being allowed to take charge, to talk to peers and adults and to be obviously listened to is great for self-esteem and for allowing children to believe in themselves. The children involved in the focus groups seemed genuinely empowered by their involvement and can note themselves that they come out of it feeling more confident, knowledgeable and able. This confidence or empowerment is almost a secondary benefit of the GSSfS but it creates invaluable and lasting impressions on the students involved.
- For the teachers, many noted a renewed enthusiasm and curiosity that had maybe waned over the years. As well as encouraging more interesting and involved teaching, this will surely benefit schools by ensuring teachers are motivated, proactive and happy in their roles.
- The Great Science Share for Schools is very much opening up a path to science. For many, before the GSSfS, children either didn't know much about science or found it boring. It wasn't something that elicited much interest or enthusiasm. Through the initiative they are much more likely to seek out the subject; now, in high school and potentially later on.
- The skills that are being learnt carry through to all elements of learning and deliver benefits in many areas of life. Specifically, the ability to ask better scientific questions, with better meaning and being grounded in purpose. Also; the ability to understand how best to answer each question and which type of enquiry will lead to the most robust findings.
- The ability to make decisions and feel empowered to make decisions is another important trait that is being learnt and that is often overlooked. Again, creating life skills that may not usually be taught until much later in life.

5. Overall Insights (cont'd)

- In previous years' evaluations, our research has been focused on teachers and other education professionals. This year by talking to the pupils themselves, we were able to add a further dimension to the research and see and understand first-hand the impact that the GSSfS is having on those upon whom the event is focused. What is difficult to get across in this report is the real excitement that the children obviously felt. They radiated energy and in the main couldn't wait to report their thoughts on being at the event. It was clear that being part of this is very special to them.
- When schools become a part of the GSSfS, a clear pattern of involvement seems to develop. There is an initial testing out – either by attending an event hosted by others, e.g. the Greater Manchester flagship, or dipping a toe in the water by hosting something in the classroom. This invariably delivers positive impact, which leads to schools wanting to do more the following year. The second year of activity then becomes a wider or more involved affair – featuring the whole school or taking more children along or doing something bigger and better. Each year of involvement gives teachers confidence that they can do this and that empowers them to bring more and better science to the classroom. After attending a hosted event for a couple of years, it is noticed that some teachers choose to host their own, almost replica events, in school. This has the benefit of freeing up space at the hosted events to encourage other new schools, whilst widening the reach in individual schools and out to the local areas, thus creating a natural growth and development platform for the GSSfS.
- Overall the Great Science Share for Schools delivers numerous and significant benefits to children and teachers alike and year on year the benefit of being involved is becoming greater. However, there is considerable scope still to take the GSSfS forward and to develop it into a UK wide institution with global possibilities.

For more information or contact with the Great Science Share for Schools team email greatscienceshare@manchester.ac.uk