The Curiosity Programme

Final Report

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BBC Children in Need

wellcome

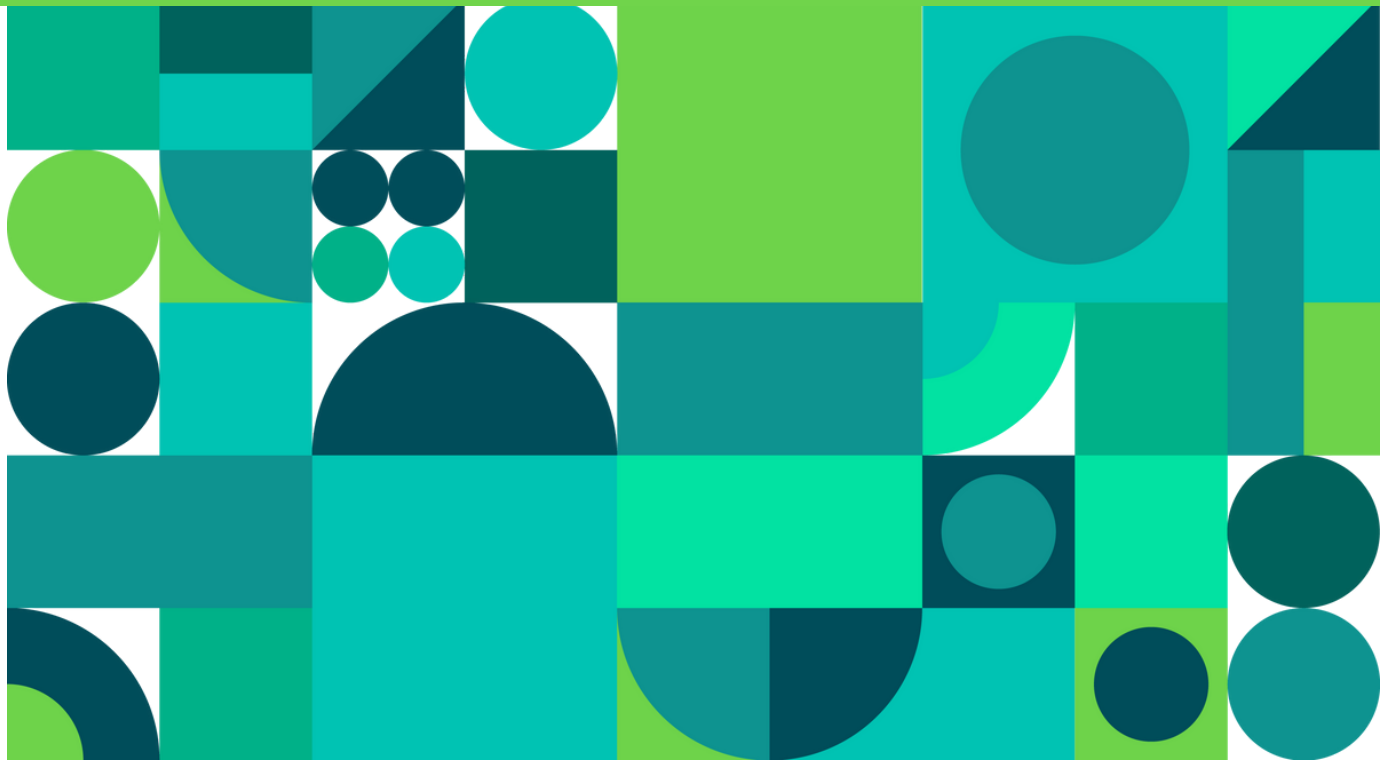


TABLE OF CONTENTS

EXECUTIVE SUMMARY 3

1. CURIOSITY PROGRAMME 5

Background 6
Aims and rationale 7
Theory of change 8
Differences framework 10
Impact of COVID-19 pandemic 11
Science activity illustration 12
Evaluation methodology 13

2. OUTCOMES AND ANNUAL COMPARISONS 19

Year 1 summary 20
Year 2 summary 21
Year 3 summary 22
Curiosity programme changes overtime 23

3. PROGRAMME LEVEL RESULTS 24

Year 3 programme level results 25

4. YEAR 2 AND 3 LONGITUDINAL DATA 32

Building Block comparisons over time 33
Qualitative comparison over time 36
Tracking individuals over time 38

5. REFLECTION AND CONCLUSIONS 40

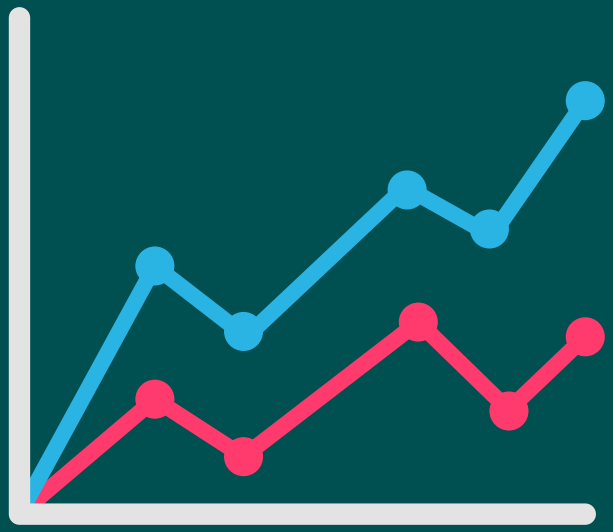
Project engagement and building evaluative capacity 41
Developing young people as ethnographers 43
What is distinctive about informal science? [ISL] 44
Spotlight: One young person's Curiosity Journey 46
Spotlight: Youth Outcomes 47
Conclusion and Legacy 49
Reflections on Legacy 53
Reflections on the Evaluation 54

6. CASE STUDIES 58

Abraham Moss Warriors 62
University of Birmingham 65
Getting Better Together 69
Knowle West Media Centre 73
North East Autism Society 76
Warrington Youth Zone 79

AUTHORS 79

EXECUTIVE SUMMARY



Curiosity Programme Evaluation: Summary

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Curiosity Projects' Aim is to increase the number of young people who are safe, happy, secure and able to reach their potential, through engagement with ISL.

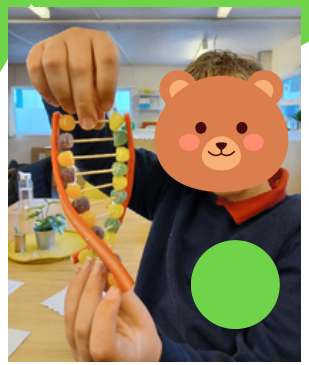
Curiosity Programme Aim is to increase delivery of informal science learning (ISL) as science for youth development to improve the lives of young people experiencing challenges and issues, and their relationship with science.

Evaluation Aim is to demonstrate change on young people and projects and to better understand the distinctive role of ISL in achieving positive impacts for young people affected by challenges and issues.

Informal Science Learning (ISL)

ISL is at the core of Curiosity Projects' delivery. This Programme evaluation demonstrated the beneficial **impacts of ISL** across multiple areas of youth development, achieving wider youth outcomes such as **improved resilience, empowerment, skills and social relationships**.

Additional outcomes achieved by Curiosity Projects (outside of the BBC CiN Difference Framework) included **improved mental health and wellbeing, increased physical activity and improved local connectedness**.



Evaluation Approach

Project and Programme level Theories of Change were developed and used in conjunction with the BBC CiN Difference Framework to design a robust evaluation approach. Funded organisations were supported to collect data that demonstrated the impact of their delivery on young peoples lives.

Methods

Results

- Quantitative surveys
- Qualitative tools
- Case studies
- Youth Voice
  Peer Research Video

Data volume and quality increased year on year, and projects developed **increased capacity** to self-evaluate, and **improved skills** in demonstrating impact.

YEAR 1

25 PROJECTS

OVER **180** YOUNG PEOPLE

SOME QUALITATIVE EVIDENCE

149 SURVEYS ANALYSED

YEAR 2

24 PROJECTS

OVER **425** YOUNG PEOPLE

128 QUALITATIVE FILES ANALYSED

242 SURVEYS ANALYSED

YEAR 3

23 PROJECTS

OVER **820** YOUNG PEOPLE

565 QUALITATIVE FILES ANALYSED

575 SURVEYS ANALYSED

SECTION 1 - Curiosity Programme: Background and Rationale

Curiosity Programme

Background

The second round of the Curiosity Programme, run in partnership by The Wellcome Trust and BBC Children in Need, funded 25 youth sector organisations to deliver projects with informal science learning (ISL) as the core component of their delivery. The funded organisations vary in terms of what they offer and the types of young people they target, but the unifying characteristic across all Curiosity projects is that the young people face a defined challenge or issue in their lives.

The funded organisations deliver a wide range of types of science, to meet the needs of a diverse range of young people in terms of age, ability and issues experienced. Science is delivered informally in contrast to how science is usually taught in formal settings, such as schools. As such, the aim is to break down perceived barriers to STEM education.

More importantly, the youth organisations use ISL as a tool to deliver beneficial impact across multiple areas of youth development. The first round of Curiosity funding indicated that ISL can help achieve traditional and non-science related youth outcomes such as improved confidence, relationships, empowerment, health, and skills.

The purposeful use of ISL to deliver wider youth outcomes has not been extensively funded in the UK before, and rarely researched - no programme of this scale and type has existed before in the UK. The funders sought to better understand the role that science can have in the achievement of youth outcomes as well as in the achievement of science-related outcomes amongst young people, when delivered in an informal setting.

The evaluation of the Curiosity programme was commissioned from Substance and Graphic Science. A core aim of the evaluation was to better understand whether there is a distinctive role of ISL in achieving positive impacts for young people. It is hoped that this understanding will help to inform both the STEM and youth development sectors of how ISL can be used in this context. It is hoped that learning can encourage more funding for ISL so it can become a more commonly used youth engagement tool, as is the case for other activities such as sport, drama, music, and art.

This is the final report of the three year evaluation of the Curiosity Programme. The report details the results of data collection in Year 3, comparative data where possible across all three years and overall conclusions from the research.

Curiosity Programme

Aims and Rationale

A separate evaluation of the pilot 'round 1' of Curiosity (Jan-Sept 2018) demonstrated to some degree that the funded projects were effective in delivering youth outcomes as defined in BBC Children in Need's (CiN) Difference Framework. The evaluation also hinted at outcomes that were potentially distinctive to ISL in youth programmes. These were:

- New ways of thinking for staff that use experimentation, exploration, and questioning.
- Empowerment and resilience through failure; the nature of scientific exploration encourages mistakes and 'failure' to be used as positive learning.
- Opportunities to engage with more and different young people; for example, young people who are not interested in sport or art.
- Changing young people's attitudes to and relationship with science.

This evaluation, which covers the second round of funding, further explores these themes in addition to developing a deeper dive at the role of ISL in delivering traditional youth work outcomes through the lens of the CiN Difference Framework. This evaluation sought **to demonstrate the BBC CiN Differences Framework in a more robust, statistically significant and descriptive manner.**

Curiosity Projects' Aim is to increase the number of young people who are safe, happy, secure and able to reach their potential, through engagement with ISL.

Curiosity Programme Aim is to increase delivery of informal science learning (ISL) as science for youth development to improve the lives of young people experiencing challenges and issues, and their relationship with science.

Evaluation Aim is to demonstrate change on young people and projects and to better understand the distinctive role of ISL in achieving positive impacts for young people affected by challenges and issues.

A bank of individual project reports (23) has been produced to accompany this programme level report. These are aimed at grantee projects as well as BBC CiN and provide further detail of how the Curiosity projects affect change at local level.

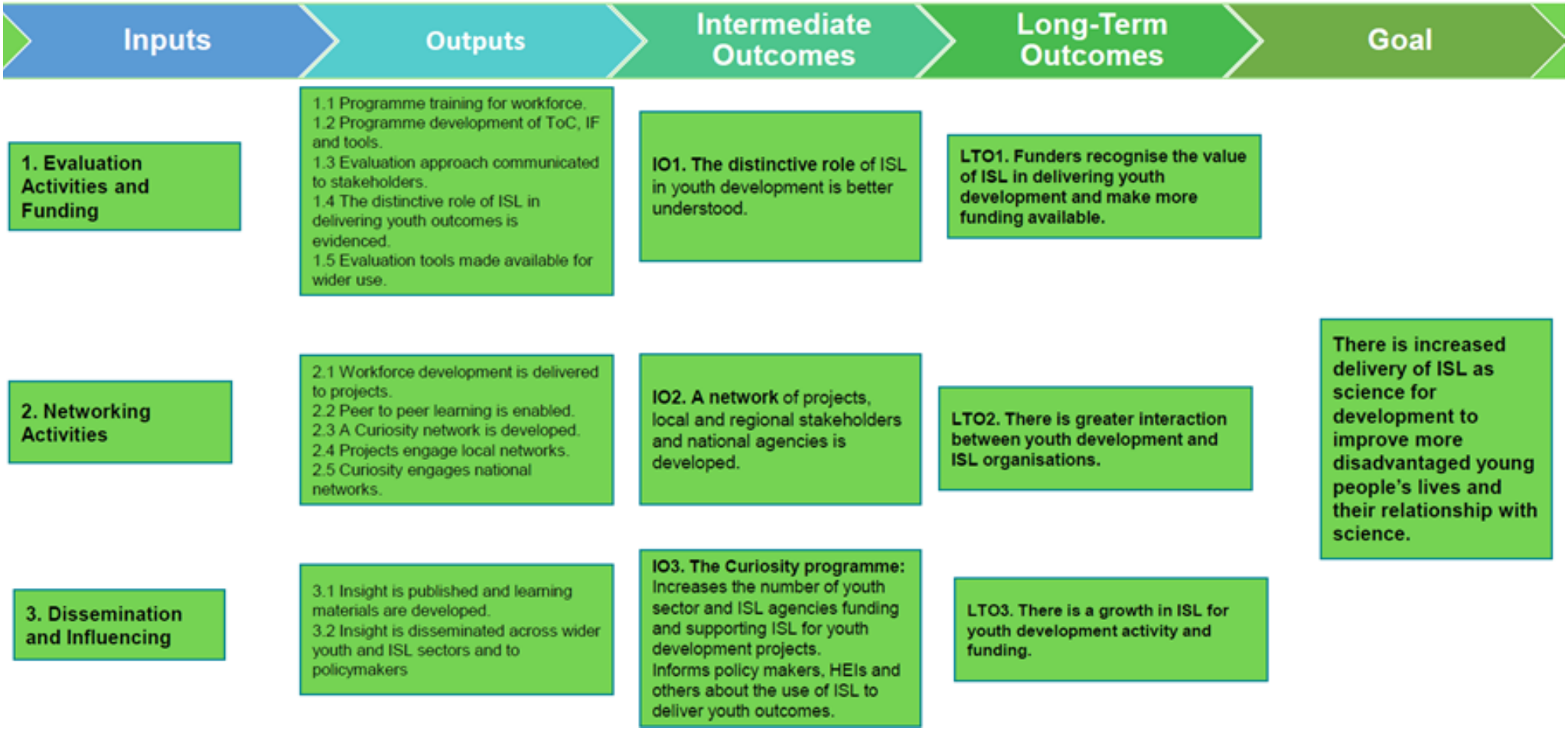
Further standalone case-study reports have been produced by the evaluation team, to document the findings from our in-depth and light-touch studies. These can be found in the Appendix of this report.

Curiosity Programme

Theory of Change

At the beginning of the evaluation, the goals of the Curiosity programme were reviewed and refined in a Theory of Change (ToC) exercise to inform the approach. Two ToCs were developed for the Curiosity fund – an overarching 'programme level' ToC, and 'project level' ToC that focuses on the individual Curiosity-funded projects.

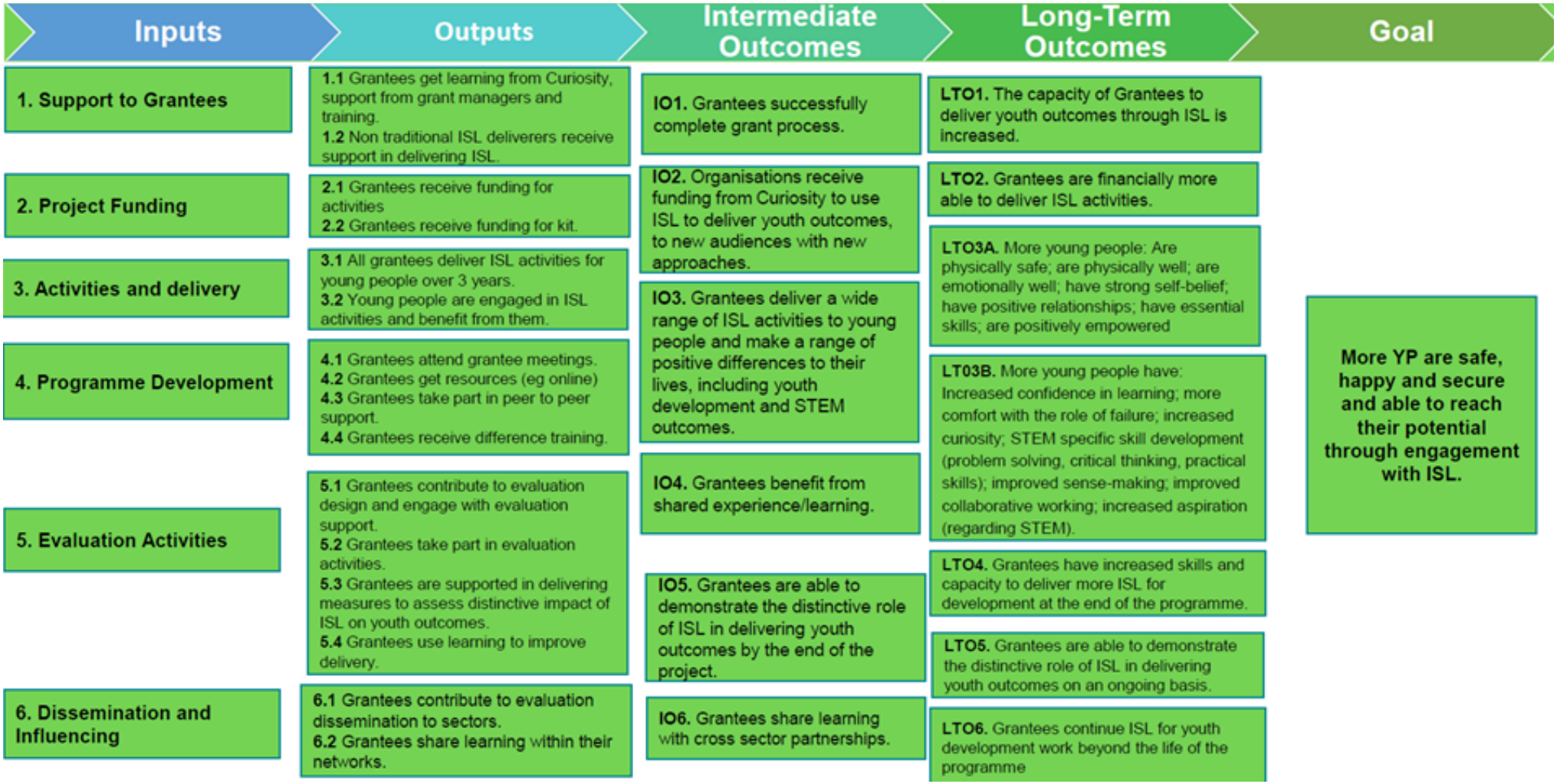
Programme Theory of Change



Curiosity Programme

Theory of Change

Project Theory of Change



Curiosity Programme

Differences Framework

The seven BBC CiN Building Blocks are:

- Physically safe
- Physically well
- Emotionally well
- Strong self-belief
- Positive relationships
- Essential skills
- Positively empowered

BBC CiN Building Block	Difference Categories - coded from projects						
Physically safe	Access to safe spaces	Remove self from harm					
Physically well	Physical activity or healthy diet	Personal movement and mobility	Health choices on risky activity	Quality of healthcare support			
Emotionally well	Having fun and enjoyment	Manage feelings and emotions	Effects of distress or trauma	Manage mental ill health			
Strong self-belief	Confidence and self-esteem	Pride in personal achievements	Sense of self and identity	Horizons and expectations for self			
Positive relationships	Family or carers relationships	Friend or peer relationships	Relating to trusted adults	General relationships with others	Inclusion and belong to communities	*Reduced social isolation*	
Essential skills	Improved social skills	Improved life skills	Engage and achieve in EET	Better communicatio n skills	Able to express creativity		
Positively empowered	Degrees of independence	Making informed life choices	Participation and expressing self	Positive behaviour - groups or social	Positive behaviour - ASB / Crime	Motivation and achieving goals	
STEM	*Increased confidence in learning*	*Are more comfortable with failure*	*Have increased curiosity*	*Have STEM specific skill*	*Have improved sense making*	*Have improved collaborative working*	*Have increased aspirations regarding STEM*

Curiosity projects were tasked with selecting three key outcomes or 'differences' which they aim to achieve for their children and young people through their work. Each difference was aligned to one of the Building Blocks – for example, 'young people have increased resilience' related to the 'emotionally well' Building Block. Differences were worded in the project's own language.

To code qualitative data, the evaluation team added one additional difference code to to the Positive Relationships Building Block ("Reduced social isolation"), and a number of STEM-related outcomes. Through developing a robust evaluation framework and associated research methodologies, it has been possible to demonstrate the **programme wide** and **project level impact** Curiosity has had against the BBC CiN's Differences Framework.

Curiosity Programme

Impact of the COVID-19 Pandemic

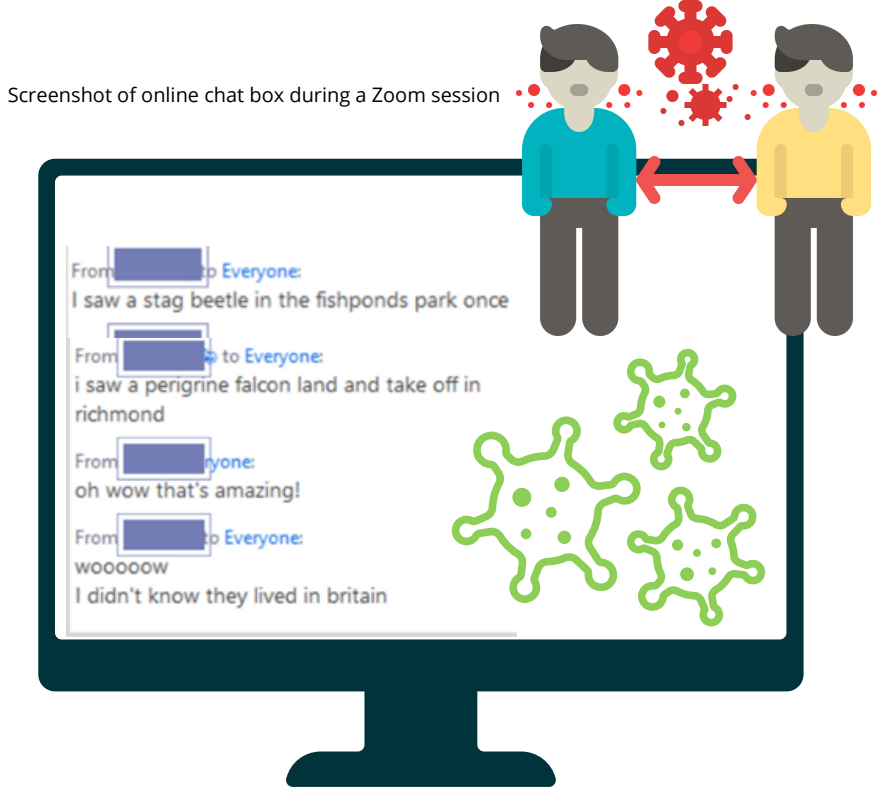
As discussed in the Year 1 and year 2 interim reports, the COVID-19 pandemic broke out in early 2020, just a few months after the initiation of the programme in November 2019. Project delivery was impacted to varying degrees due to the COVID-19 restrictions, and this had a knock-on effect on the evaluation. Some projects were severely affected and could deliver little or no activity during this time. Others were able to adapt delivery online and deliver remote interactive sessions, albeit with reduced numbers in some cases.

In some cases, online delivery enabled a wider reach and increased numbers of participants. Some projects were able to offer both online and adapted in person sessions, with a subset of these planning to continue blended delivery options longer term. As restrictions lifted, face to face delivery resumed across the programme. Projects saw these challenges as opportunity to innovate and adapt delivery models, and in some case improving them.

The impact of the pandemic on the evaluation was primarily seen in the reduction of data collected by the projects in Year 1. With the removal of restrictions, the flexibility of the programme delivery obligations and the support of the evaluation team, data completion dramatically improved in Years 2 and 3.

One project withdrew from the Curiosity programme in Year 1 and returned unspent funds to BBC CiN. The immediate and medium-term impact of COVID-19 meant that their young people (young carers) required a focus on their core support offer. With one execption, all remaining projects continued delivery throughout Years 2 and 3.

Screenshot of online chat box during a Zoom session



"Aspirations have been difficult to reach at the moment, because of the pandemic. It's hard to imagine a future, hard to plan. But when they are there doing the project, it's an instant gratification for them, they get something back from the work they put in and end sessions with a smile on their face." [Project staff]

"I was so worried at the beginning of lockdown about what would happen to the project but received so much encouraging support from Curiosity." [Project staff]

"The ability to innovate during COVID via a hybrid model was brilliant. We are working with young people with complex lived experiences and to help them with experiential learning, especially when they couldn't leave the house was very important." [Project Lead]

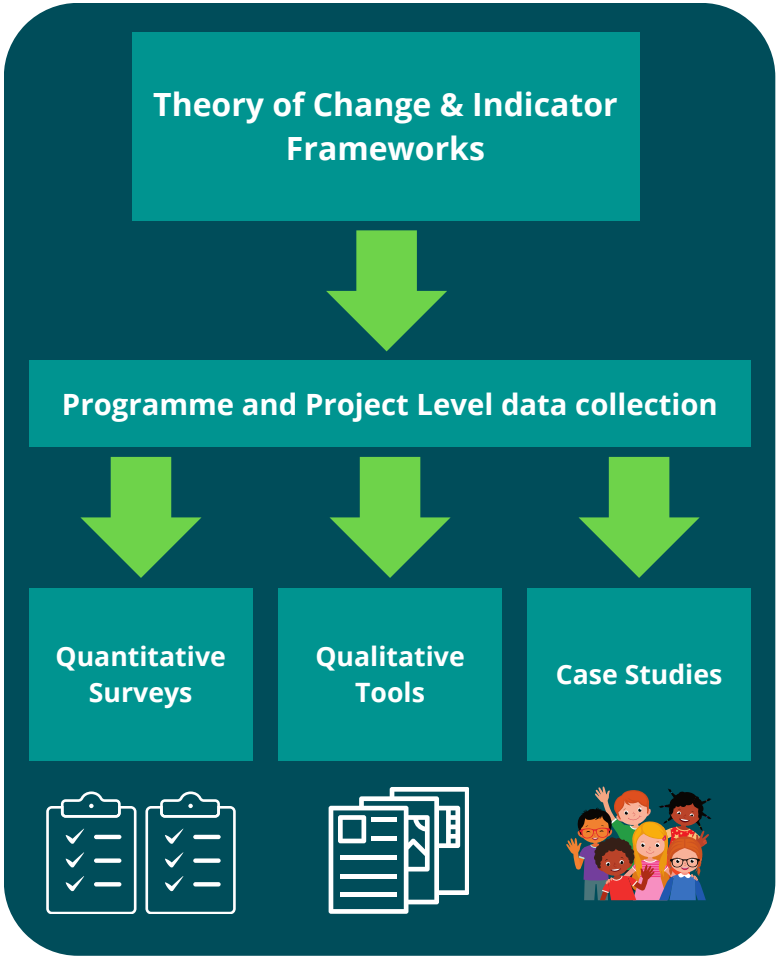
23 PROJECTS ACROSS THE CURIOSITY PROGRAMME - A WEALTH OF SCIENCE ACTIVITIES FOR YOUNG PEOPLE

Curiosity Programme

Evaluation Methodology Overview

The evaluation was structured around indicator frameworks that were designed to accompany the project and programme level Theories of Change. The data collection comprised:

- Measurement of youth outcomes and STEM outcomes achieved by individual projects using **quantitative surveys** and a range of **qualitative tools**.
- Investigation of the role of ISL in helping projects to achieve youth outcomes, using **project case studies** and interviews.
- Process evaluation of the projects' experiences of the programme including **project interviews, case studies and evaluation team observations**.



Quantitative tools
A pre- and post- survey approach was developed that could be tailored to each project's differences and which also measured the impact of the project on science outcomes.

Qualitative tools
A range of easy to use and effective qualitative tool 'guides' were produced by the evaluation team that could be utilised by projects to collect their own qualitative data to produce further evidence of differences and ISL outcomes.

Case studies
Each year, a small number of projects were selected as 'case studies' to generate deeper understanding of the operation of the project, the successes and challenges faced, the role of ISL in achieving differences and to hear directly from the voices of children and young people.

Curiosity Programme

Evaluation Methodology: Quantitative Surveys

As detailed in the Year 1 interim report, a suite of questions was developed to measure the CiN Differences and Building Blocks and wider STEM outcomes. The questions were developed through co-design, validated sources and literature searches.

Each project received a project specific questionnaire relating to their agreed outcome areas. Where requested, projects were provided with pictorial surveys due to factors such as literacy levels, age or special educational needs or disabilities. The team offered online completion or paper versions for their projects to allow for flexibility across project settings and engagement styles.

Quantitative Analysis

Paired t-tests are considered more powerful than unpaired t-tests because they are capturing the difference in scores within the same individuals and not only the difference between overall groups. Because t-tests assume a certain distribution of values, Substance has also confirmed results using the Wilcoxon signed-rank test.

The evaluation team performed weekly data audits looking at the completeness of consent, baseline and follow-up surveys. Through this process the embedded researcher liaised with projects and shared the names of young people who had missing consent or follow-up data.

This project level support resulted in increased buy-in and commitment by the project staff to improve their data sets. As such this year the quantitative data has been analysed at both project and programme level using the gold standard of 'participant ID matched' analysis using three data points, those being consent, pre-project and follow-up project involvement. The youth participant surveys were non-mandatory for projects where their engagement strategy did not support completion of surveys. Project delivery and relationship building was paramount to the evaluation and management team.

Young Person Questionnaire Headlines

- Co-designed with projects and young people
- Validated tools
- Online and paper options
- Word and tick box or pictorial versions
- 575 useable individuals of gold standard ID matched results for consent, pre and follow-up

Curiosity Programme

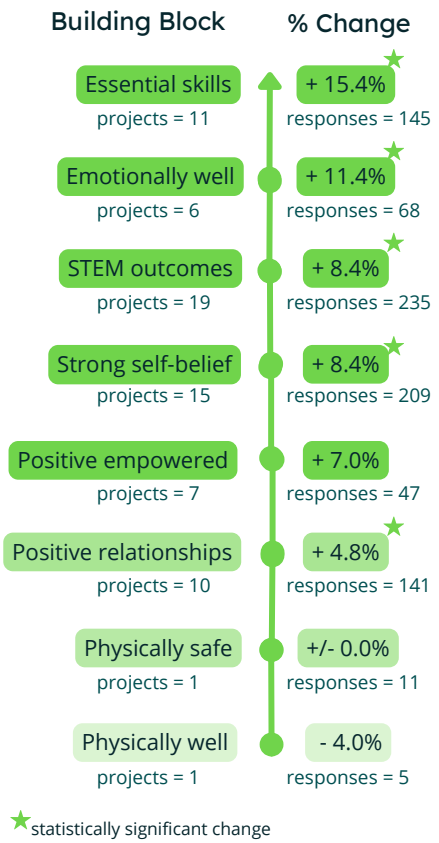
Updated Quantitative Methodology

Depending on the survey data and aims, there can be different ways of calculating the score percentage change between baseline and post-delivery scores. Like other qualitative evaluation methods, the quantitative approach has also evolved over time.

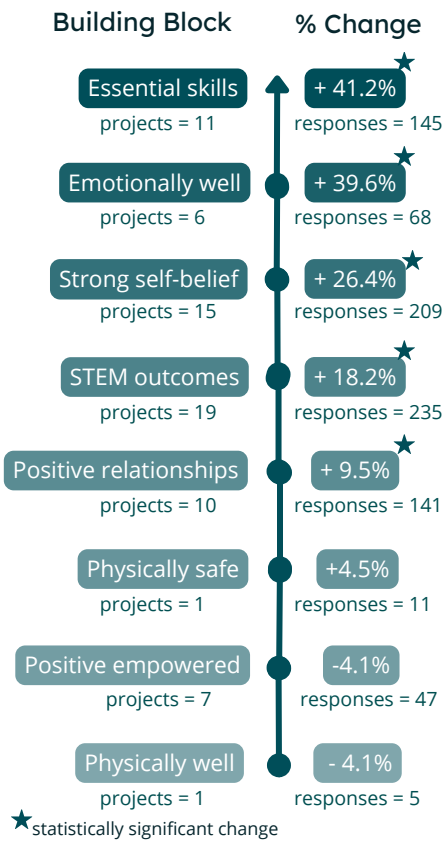
Year 1 did not have paired survey data. As a result, the calculation was more limited using project averages and not testing for statistical significance. In **Year 2**, the evaluation team introduced paired t-tests to assess potential statistical significance but otherwise followed a similar approach to Year 1 in order to better compare data and development between both years. During **Year 3**, which saw many more survey results, the evaluation team **adjusted the way percentage change was calculated**. It now focused more closely on change within the paired individuals rather than their projects. It also calculated the percentage change in relation to the baseline score rather than the average number of questions, as had previously been done. The **aim was to refine the approach** based on larger numbers of survey responses and reflection on learning from previous years.

This resulted in overall higher percentage change increases across most Building Blocks (see visualisations on the right). It is important to note that **the overall picture remains the same**: most Building Blocks showed a statistically significant increase between pre and post scores of young people. There are different ways of representing percentage change. This current methodology presents the *average percentage change within the young people compared to their baseline scores*.

To better compare developments between Years 2 and 3, the numbers from the Year 2 analysis were recalculated following the updated approach. While the percentage changes increased, the overall picture remains the same.



Year 2 data as calculated and presented in the Year 2 Interim report



Year 2 data re-calculated according to evolved approach taken in Year 3

Curiosity Programme

Evaluation Methodology: Qualitative Tools

A qualitative 'toolkit' containing a range of youth-friendly qualitative data collection tools and accompanying guides on how to use them, was made available for projects. The intention for these tools is for projects to use them themselves, to collect data to support their differences and provide any additional evidence of the impact of their work. Like the quantitative surveys, qualitative tools were developed in conjunction with projects to ensure they were not only robust, but also project-appropriate and user friendly. The tools and specific questions asked are able to be adapted to suit different settings and users.

The suite of tools was produced by referring to: Curiosity projects' applications to review the type of tools that projects were already using; and Substance's and Graphic Science's own bank of qualitative tools used in previous youth and ISL research.

An online qualitative data upload portal was provided to projects, so that qualitative data could be shared with the evaluation in a secure way. This also allowed Substance to monitor data provision and provide periodic reminders and support where required. In addition to uploading files the project teams were prompted to critically reflect on what the data is demonstrating through the completion of a structured feedback form.

Additional training was provided to the projects to improve the quality of the data collected to ensure it demonstrated impacts of delivery, not just detailing the work that was undertaken. This occurred via individual engagement with the projects, and through programme wide webinars and sharing of guidance. The qualitative data was analysed using specialist qualitative analytical software (NVIVO) using a coding framework centred around the BBC CiN Differences Framework, Building Blocks and STEM outcome areas.

The data generated through this rich and detailed methodology allowed the evaluation team to perform cluster analysis and frequency of occurrences around the Building Blocks to understand prominence of themes in the qualitative data. This can be used to present confirmatory or counter evidence from the quantitative data presented through the survey technique.

Curiosity Programme

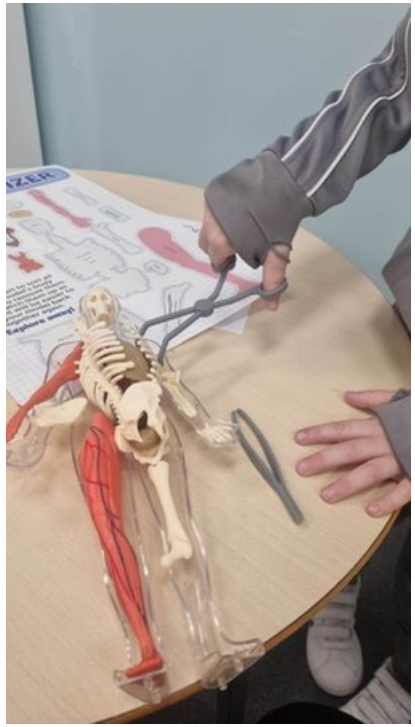
Evaluation Methodology: Case Studies

Throughout all three years of the evaluation, Substance and Graphic Science worked closely with a selection of projects through deep-dive and longitudinal light-touch style case-studies. The range of methods adopted through the case-studies describe the rich story of Curiosity to better articulate the distinctive role of ISL in achieving positive impacts for young people, specifically considering:

- What ISL is delivered by projects?
- How are youth outcomes achieved by projects?
- How STEM-related outcomes are achieved by projects?
- What role did ISL play in achieving these outcomes?

Case Study Outcomes

Project LTO1: Capacity of grantees to deliver youth outcomes through ISL
Project LTO2: Grantees more financially able to deliver ISL
Project LTO3A: Impact on young people differences
Project LTO3B: Young people and STEM outcomes
Project LTO5: Grantees are able to demonstrate the distinct role of ISL in delivering youth outcomes on an ongoing basis
Programme LTO2: Greater interaction between youth development and ISL organisations
Additional LTO: Young people are upskilled to act as youth evaluators



Case Study Methods and Outcomes

Focus group		Project LTO3A Project LTO3B Project LTO5
Observation		Project LTO1 Project LTO3A Project LTO3B
Photo diary		Project LTO3A Project LTO3B Project LTO5
ISL Staff Interview		Programme LTO2 Project LTO1
Peer Research		Project LTO3A Project LTO3B Additional LTO
Staff interview		Project LTO1 Project LTO2

Curiosity Programme

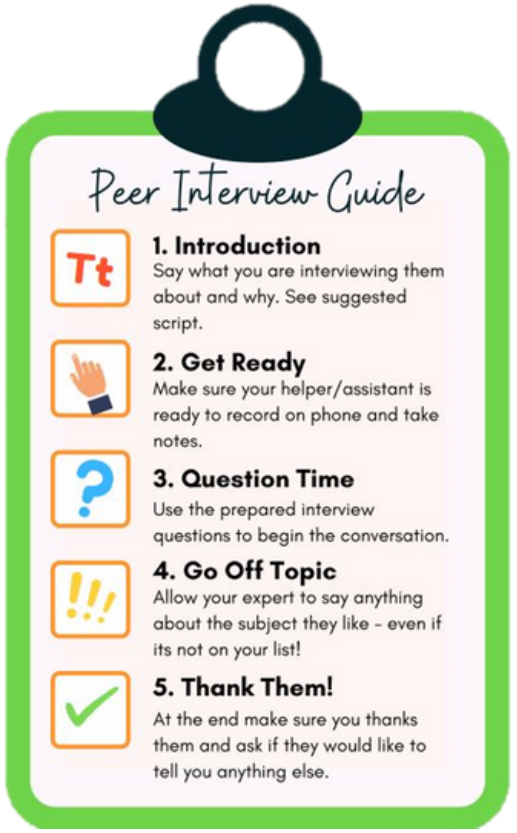
Evaluation Methodology: Youth Voice

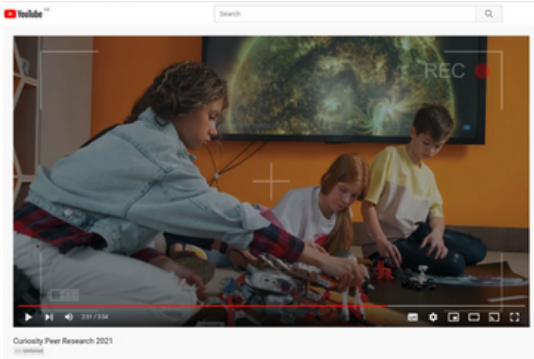
Substance has long been an advocate for the inclusion of Youth Voice and co-production in our evaluative design and output, and in Year 2 a Young Research Ambassador Programme was launched as part of the evaluation.

It is fully understood that the articles 12-15 of the United Nations Convention on the Rights of the Child[2] demonstrates the importance of the youth voice in decision making and the evaluation of measures relating to children. As discussed in the Year 2 Interim Report, it is important to extend this belief to youth interventions:

The views expressed by children may add relevant perspectives and experience and should be considered in decision-making, policymaking and preparation of laws and/or measures as well as their evaluation. (United Nations)[3]

The Young Research Ambassador Programme involved a range of accessible training resources for the young people including 1) how to conduct peer led interviews; 2) how to lead and co-facilitate focus groups and 3) how to do participant observation of sessions. A short video was produced which clearly describes the role and ethos behind peer-research, defining concepts and clarifying expectations.

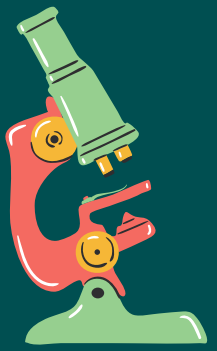




Click here: Peer Research Video

[2] Microsoft Word - CRC-C-GC-12 advance unedited for distribution.doc (ohchr.org)
[3] Section 12. Convention on the Right of the Child. United Nations. Geneva. July 2009.

SECTION 2 - Outcomes and Annual Comparisons



Year 1 Summary

Physically well responses = 5	Activity and healthy diet	0.0%
Emotionally well responses = 40	Manage feelings and emotions	+ 9.8%
	Manage mental ill health	+ 21.6%
Strong self-belief responses = 42	Confidence & self esteem	+4.5%
	Horizons	+ 21.6%
	Pride	+ 9.8%
	Sense of self	+ 21.6%
Positive relationships responses = 13	Friends & peers	-11.6%
	General	-22.0%
	Inclusion & belonging	7.0%
Essential skills responses = 7	Communication	2.5%
	Engagement	0.0%
	Life Skills	-10.7%
Physically safe		No data
Positive empowered responses = 7	Participating	+ 6.0%
	informed life choices	+ 10.6%

"Making [science] education accessible via this format really changed the way that YP viewed themselves."

"Doing this has been fantastic, it has improved my confidence and happiness when in the context of working on it"

Evaluation Overview Year 1

- Theory of Change
- Literature review
- Curiosity programme: 25 separate projects aimed to increase informal science learning (ISL) in youth development.
- Building Block analysis and next steps to better collect data to evidence the achievements of Curiosity.

The evaluation aims to explore the central question of understanding the unique role that ISL may play in delivering youth work outcomes. The year one report presented data against achievement of outcomes as described by ToCs; particularly in relation to the achievement of youth and STEM outcomes, and the role of ISL in achieving these outcomes. At that point, the outcomes had been demonstrated to some degree, although more robust evidence from projects was desired. Notably, the year 1 evaluation report highlighted that there existed 'wider' or unexpected outcomes in relation to the delivery of ISL. These observations proved essential for telling the story of Curiosity in year 1, but also for further investigation in subsequent years.

Next Steps

Despite both the Curiosity programme and the evaluation being hindered by the exceptionally difficult circumstances surrounding the pandemic, there was still a valuable story to tell about the Curiosity programme during this period and its contributions to the youth and ISL sectors. The primary goals for the evaluation team in the subsequent two years were to:

- Increase engagement with projects to produce more quantitative data.
- Provide more in-depth and regular analysis of the qualitative data.
- Undertake more case study work to improve qualitative evidence
- Youth voice research methods, such as peer research rolled out.

Year 2 Impact Summary

Building Block	% Change
Essential skills projects = 11	+ 41.2% ★ responses = 145
Emotionally well projects = 6	+ 39.6% ★ responses = 68
Strong self-belief projects = 15	+ 26.4% ★ responses = 209
STEM outcomes projects = 19	+ 18.2% ★ responses = 235
Positive relationships projects = 10	+ 9.5% ★ responses = 141
Physically safe projects = 1	+4.5% responses = 11
Positive empowered projects = 7	-4.1% responses = 47
Physically well projects = 1	- 4.1% responses = 5

★statistically significant change

"I learnt to be resilient and not give up, even when things don't go to plan." (YP)

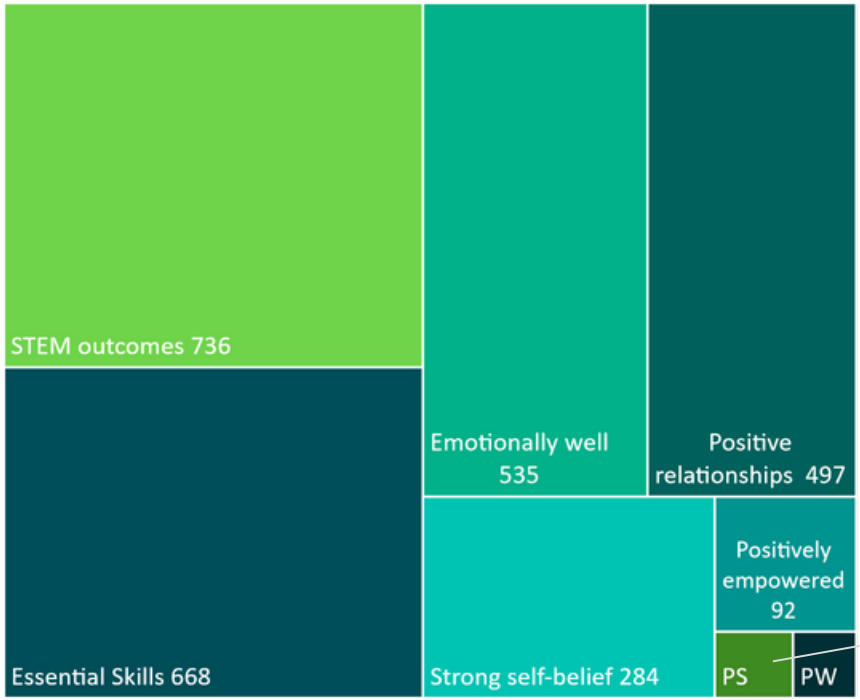
Year 2 Outcomes

Whilst it has been suggested that participating in informal science activities contributes to youth development outcomes, some specific areas emerged across year two that illustrated a distinctive role and influence of informal science. Amongst these were positive influences on working through challenges, confidence in learning, and collaborative working in order to problem solve and try new things.

STEM related and essential skill outcomes were the most commonly described across the year 2 qualitative data. In particular, progress towards STEM specific skill development, improved collaborative working, improved life and social skills, and better communication skills, were highlighted.

Having fun and enjoyment was the most frequently described aspect of being emotionally well, with friend and peer relationships the most described aspect of having positive relationships

Frequency of reference in qualitative data



"I've learned that working with others is like a very, a very useful skill because if you do it by yourself, sometimes it's very hard" (YP)

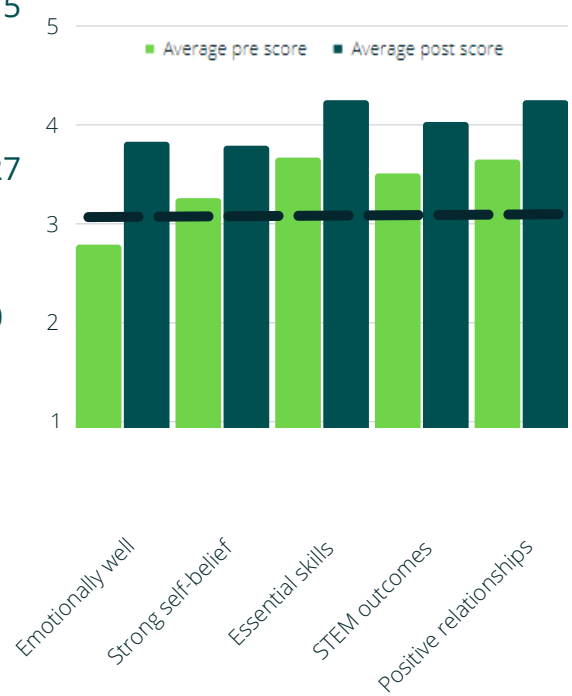
"Through the project and activities the young people have been exposed to engaging and learning science in a different way to school and in different ways than they would expect. It has been beneficial to their personal development, growth and future plans" (Project lead)

Year 3 Summary

Building Block	% Change	
Emotionally well	+ 52.47% ★	projects = 6 / responses = 92
Strong self-belief	+ 26.70% ★	projects = 12 / responses = 539
Essential skills	+ 23.37% ★	projects = 9 / responses = 359
STEM outcomes	+21.39% ★	projects = 16 / responses = 575
Positive relationships	+ 16.50% ★	projects = 9 / responses = 427
Positively empowered	+13.45% ★	projects = 4 / responses = 60
Physically safe	+4.06%	projects = 1 / responses = 92
Physically well	0%	projects = 0 / responses = 0

★ statistically significant change

"I have learned that I can work and communicate with others and develop relationships without being afraid of getting judged."



Year 3 Outcomes

Year 3 evaluation data illustrated that **nearly all of the intended youth outcome areas saw a significant positive improvement** between pre and follow-up levels for the young people involved in Curiosity.

The survey results illustrate particularly high levels of positive achievements around the **emotionally well** and **strong belief Building Blocks.**

In total, five case studies were conducted, 575 surveys were collected from 16 projects and 565 qualitative files analysed. An analysis of the changes of output overtime has also been completed as part of the final year report.

Frequency of reference in qualitative data

Curiosity Programme Evaluation Annual Engagement

YEAR 1

25
PROJECTS

OVER
180
YOUNG PEOPLE

SOME
QUALITATIVE
EVIDENCE

149
SURVEYS ANALYSED

YEAR 2

24
PROJECTS

OVER
425
YOUNG PEOPLE

128
QUALITATIVE FILES
ANALYSED

242
SURVEYS ANALYSED

YEAR 3

23
PROJECTS

OVER
820
YOUNG PEOPLE

565
QUALITATIVE
FILES ANALYSED

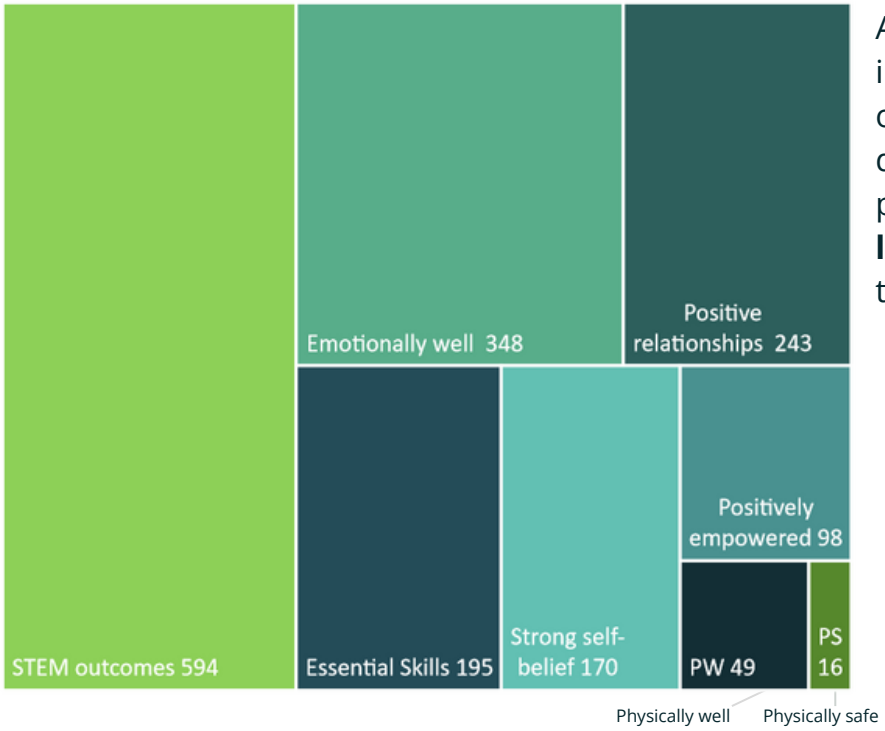
575
SURVEYS ANALYSED

SECTION 3 - Programme Level Results

Year 3 Programme Level Results

Outcomes

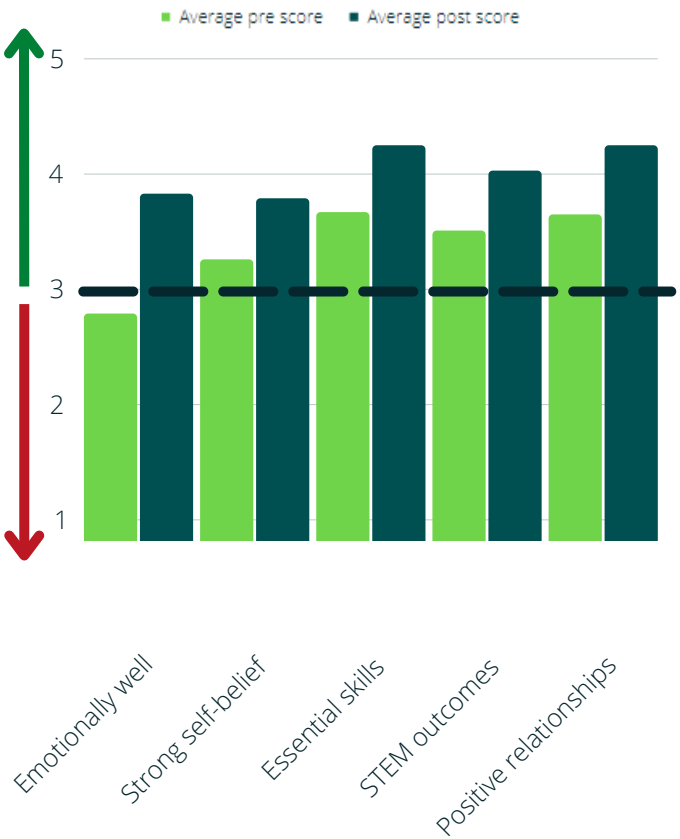
Year 3 biggest outcome areas



The mosaic chart above shows the number of qualitative references per Building Block. The most referenced Building Block was 'STEM outcomes', most notably STEM specific skill development. 'Emotionally well' was highly referenced with many projects evidencing the key role of having fun and enjoyment. Similarly to Year 2, the trend represented in the qualitative data was well aligned to the quantitative data analysis results discussed further on the next page.

As noted previously, it has been suggested that participating in informal science activities contributes to youth development outcomes. Data from the evaluation has begun to illustrate a distinctive role and influence of informal science. Amongst these are positive influences on **working through challenges, confidence in learning, and collaborative working** in order to problem solve and try new things.

"It broadened their understanding of what science can entail ... It can be about the more intricate things. It can be about discussion. The more that they got involved in the project, the more they learned and they said, 'Oh, this could be a future career for me'."- University of Birmingham Youth Worker



Year 3 Programme Level Results

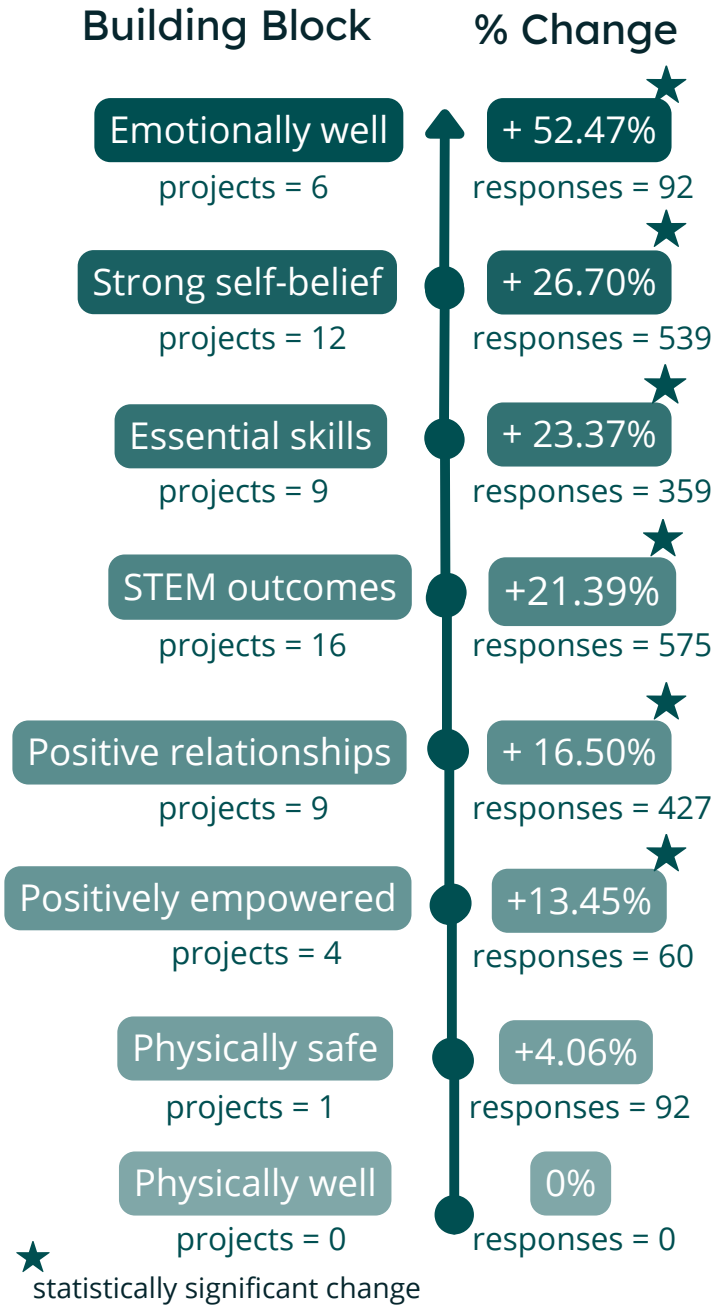


Figure: Demonstrated differences in Curiosity Building Blocks

Programme survey data was matched from the survey completed at the beginning of participation and following intervention.

The data was analysed against the seven BBC CiN Building Blocks and the STEM outcomes grouped as an additional block.

From the data we are able to show:

1. The number of projects contributing to the outcome area;
2. The percentage change between pre and post intervention;
3. Whether the change was statistically significant (* paired t-test and Wilcoxon signed-rank test, $p < 0.05$).

The findings illustrate that the **nearly all of the intended youth outcome areas saw a significant positive improvement** between pre and follow-up levels for the young people. The survey results illustrate particularly high levels of positive achievements around being **emotionally well** and **strong self-belief.**

This analysis demonstrates **the direct role STEM focused activities has on the development of non-STEM youth development outcomes** - a key objective of the Curiosity programme.

Year 3 Programme Level Results

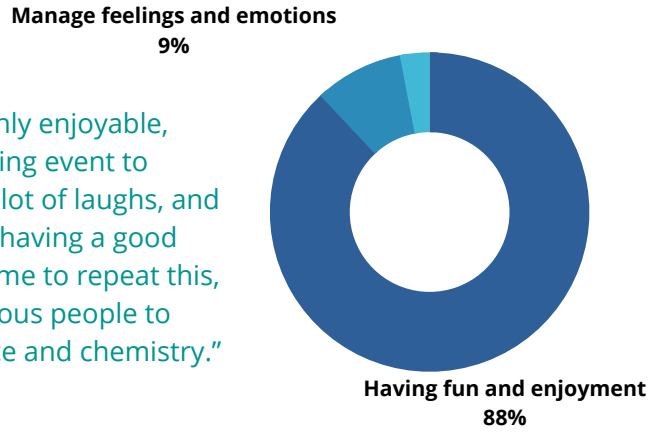
1.Emotionally Well

Being emotionally well
...is when children can manage their feelings and make sense of traumatic or emotional setbacks. For some, it is essential that they are able to manage mental ill health that can manifest itself in such things as self-harming, depression or suicidal thoughts. For many, emotional well-being is built on having fun, getting a break and experiencing freedom from day-to-day challenges.

- 6 projects investigated 'emotionally well'.
- There were 92 paired responses.

Evidence
The survey data illustrated a **52.47% improvement in the responses to the emotionally well Building Block. This improvement was statistically significant.**

"To sum up, it was a highly enjoyable, interesting, and fascinating event to participate in. We had a lot of laughs, and everyone seemed to be having a good time. It would be awesome to repeat this, as it encouraged numerous people to learn more about science and chemistry." - Young person



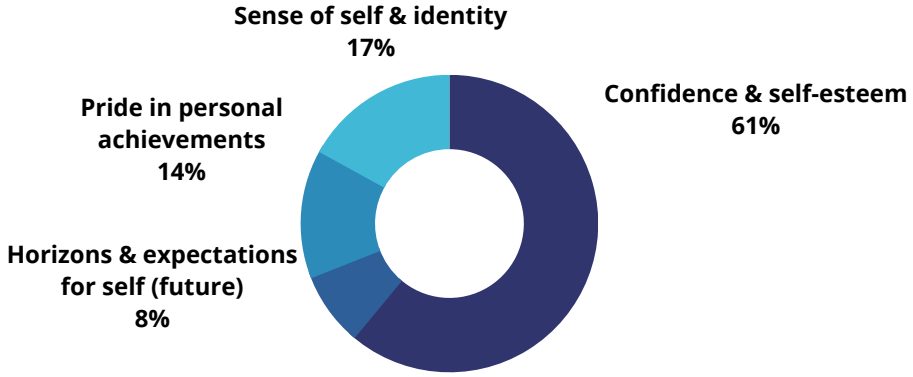
2.Strong Self-Belief

Having strong self-belief
...is when children have a positive sense of who they are and what they can achieve. Self-belief can be a combination of factors including self-esteem, confidence, pride in accomplishments, a sense of identity and having positive expectations for your future life.

- 12 projects investigated "strong self-belief"
- There were 539 paired responses.

Evidence
The strong self-belief survey questions returned a **significant increase of 26.7% post-project.** The measures include; confidence and self-belief; pride in personal achievements; a sense of self and identity and horizons and expectations of self.

"It's given me a lot more confidence with people and myself, I believe in myself a lot more, rather than just being 'I have to do this', it's more like 'I can do this'. I have the skills to do it more effectively and better, which would help me in school." - Young person



Year 3 Programme Level Results

To find out more about STEM and changes, see next pages

3.Essential skills

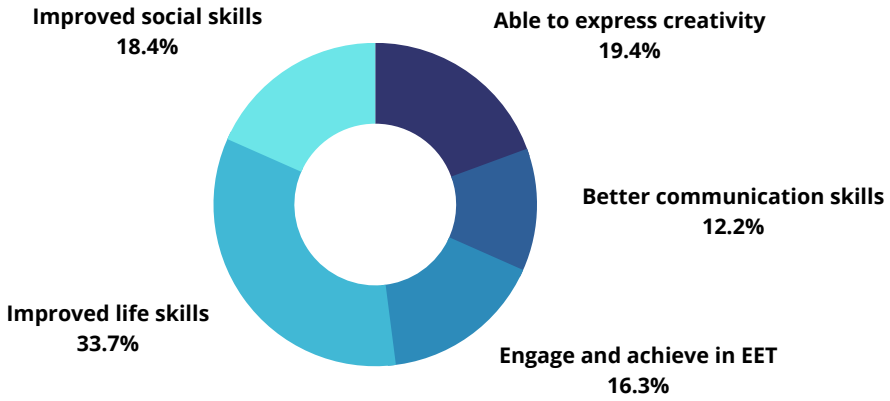
Having essential skills
...is when children have a wide range of personal and practical skills. Alongside various social, life, communication and creative skills, such as imagination and personal expression, we include children's willingness and ability to engage with and achieve in education, training and employment.

Methods

- 9 projects investigated "essential skills"
- There were 359 paired responses

Evidence

There was a **23.37% significant improvement in the essential skills Building Block.**



"I have learned that I can work and communicate with others and develop relationships without being afraid of getting judged."- Young person

4.STEM

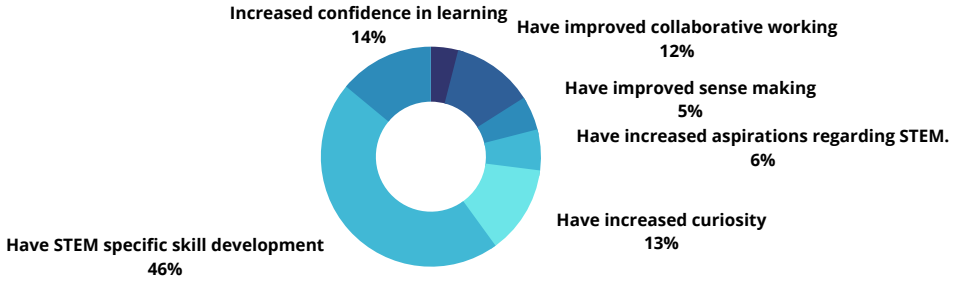
Science, Technology, Engineering and Maths
...STEM learning at its core is the education of science, technology, engineering and math. By understanding and learning these topics at a young age, we aim to inspire the next generation and make STEM more accessible.

Methods

- All 16 projects investigated STEM
- There were 575 paired responses

Evidence

There was a **21.39% significant improvement in the STEM responses.**



"I've noticed that my science grades have gone up quite a bit and school are now talking about me going up to first set. I never thought that I'd be able to do anything science related to be honest. No one in my family has ever gone to uni and now I'm thinking... maybe I can be a Dr?"- Young person

Year 3 Programme Level Results

5.Positive relationships

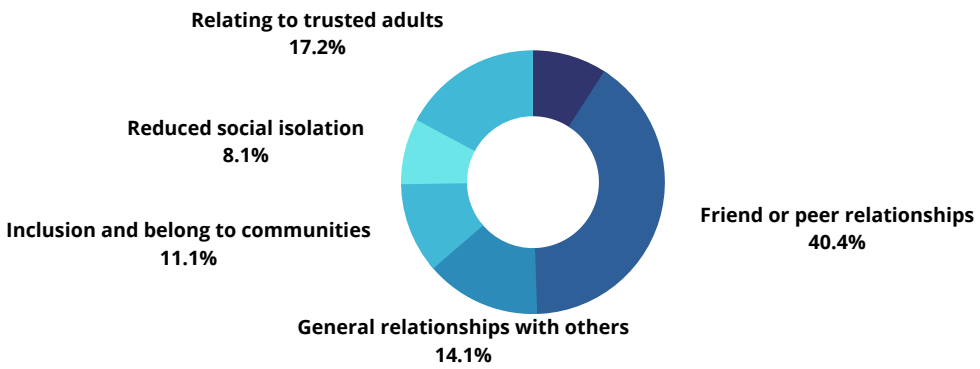
Having positive relationships
...is when children have strong, positive and affirming relationships – starting with their family, carers and friends. Having trusted peers and adults in their lives also helps overcome loneliness and provide alternatives to disruptive and harmful pathways or activities. Children also benefit from having positive relationships with social and community groups relevant to them.

Methods

- 9 projects investigated “positive relationships”.
- There were 427 paired responses.

Evidence

There was a **16.5% significant increase in the responses to the positive relationships Building Block.**



"I have also made great friends along the way and the friendships have grown since we have been on different trips that involve things to do with science " -Young person

6.Positively empowered

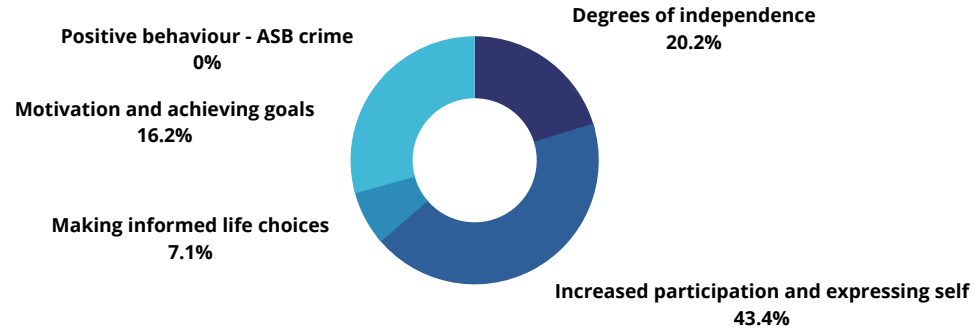
Being positively empowered
...is when children and young people can direct or manage their lives, or aspects of them. They make independent decisions, display appropriate behaviour, are motivated, express themselves and engage with activities and matters that affect them.

Methods

- 4 projects investigated "positively empowered".
- There were 60 paired responses.

Evidence

There was a **13.45% significant increase in the responses to the positively empowered Building Block.**



"My favourite part is when we do our own thing, it's good to work with people, but I like it when they leave us alone to do it ourselves"-Young person

Year 3 Programme Level Results

7.Physically safe

Being physically safe
...is when children have better access to safe spaces away from direct threat or harm, such as abuse (including online), neglect or violence. In other instances it can mean children being able to identify personal risk and take action to remove themselves from those situations, or to minimise the risk, and tell a trusted adult.

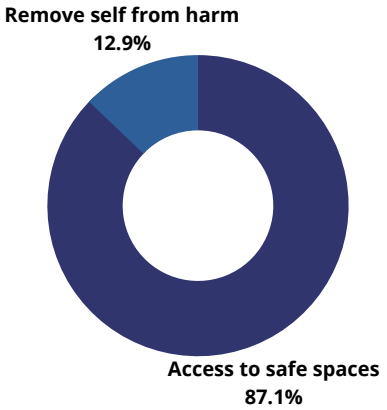
Methods

- 1 project investigated "physically safe".
- There were 92 paired responses.

Evidence

There was **a small increase of 4.06% in the responses to the physically safe Building Block.**

"The sense of a 'safe space' has created a tone which allows for more questions and using trial and error. This has allowed YP who engage to explore ideas and different methods." - Project lead

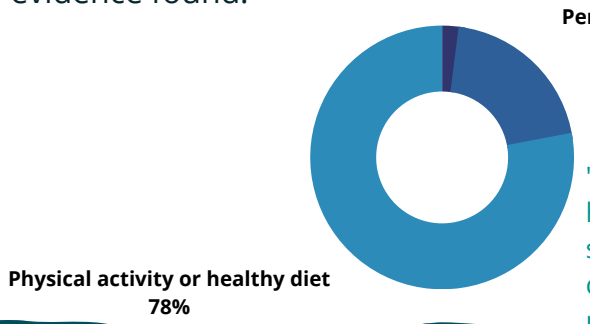


8.Physically well

Being physically well
...is when children are able to be active and socially or physically mobile – even when they may be limited due to illness or disability. It also involves having a healthy diet, good awareness of nutrition, and of having support and information to make mature choices regarding behaviours that can endanger a person's health, such as engaging in unsafe sex or substance misuse.

Methods

No projects investigated physically well in their surveys. Qual evidence found:



"Her physical improvement has been vast. She is now sitting up much taller in her chair and showing better posture and alignment. She can hold her head up independently for the majority of the class; previously she would spend most of the lesson slumped forward in her chair, but her strength has really improved." - Project lead

To understand the changes over time, and how the projects have improved and grown, we must review the results as a multi-year analysis.

The multi-year analysis can be found on the next pages.

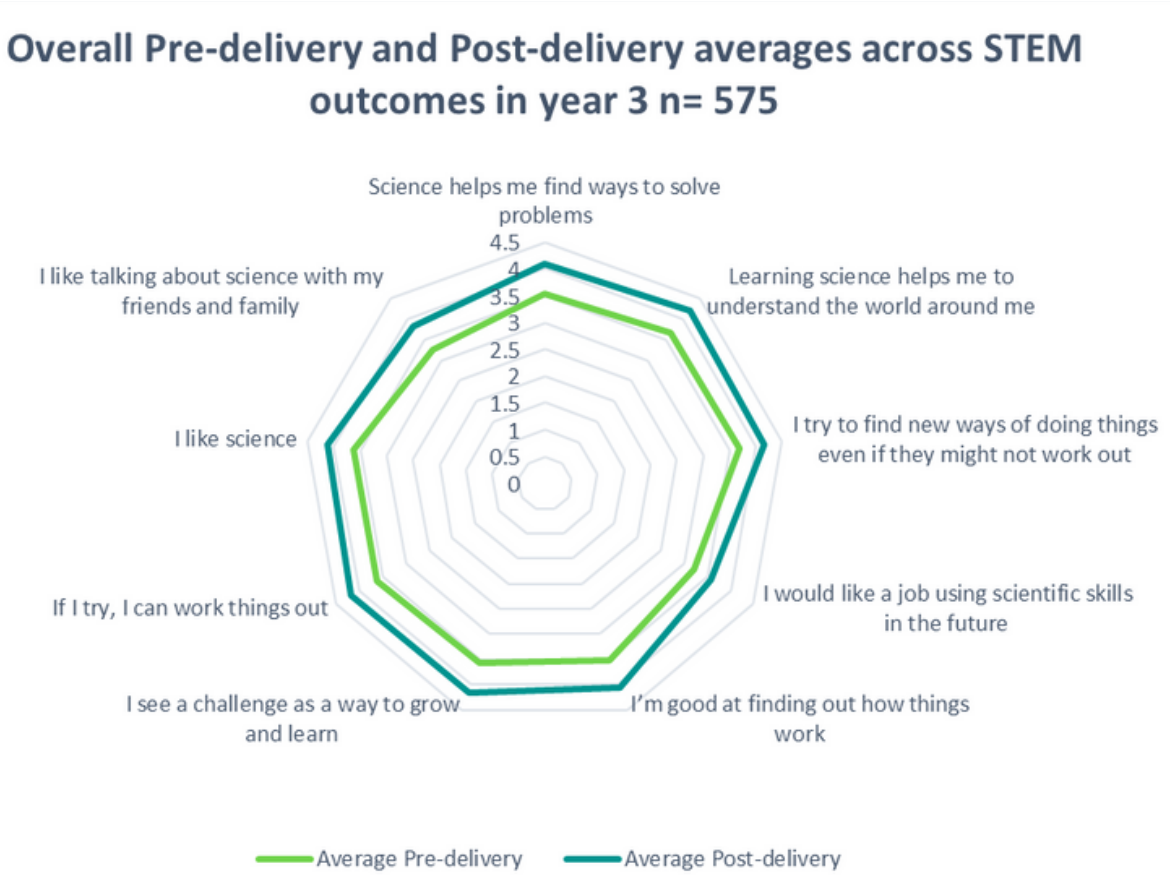
Year 3 Programme Level Results STEM

In depth Quantitative review

From the responses to the survey, there has been an **overall improvement in agreement with the STEM indicators** as shown in the radar web diagram.

Young people generally **agree more with the notion that science helps them to understand the world around them.** This has a practical application in their lives which helps their independence, knowledge and understanding of the world around them.

Crucially, the pre-engagement data shows that the majority of YP were indifferent to science, scoring 3 out of a possible 5. This meant that Curiosity was not naturally attracting science-focused individuals and therefore was opening up science to a wider group of young people. **The informal nature has switched them on to science in a way that the classroom has not. It is accessible, relatable and transferable.**



"A theme we carry across in our Curiosity Project is about how in science if you make a mistake, you can learn from it and/or adjust your experiment or project. Several comments mentioned helping someone within the group and also learning from experiments and adapting them to make it work."- Project Lead

SECTION 4 - Year 2 and 3 Longitudinal Data

Building Block Comparisons Over Time

Year 1

Physically well responses = 5	Activity and healthy diet	0.0%
Emotionally well responses = 40	Manage feelings and emotions	+ 9.8%
	Manage mental ill health	+ 21.6%
Strong self-belief responses = 42	Confidence & self esteem	+4.5%
	Horizons	+ 21.6%
	Pride	+ 9.8%
	Sense of self	+ 21.6%
Positive relationships responses = 13	Friends & peers	-11.6%
	General	-22.0%
	Inclusion & belonging	7.0%
Essential skills responses = 7	Communication	2.5%
	Engagement	0.0%
	Life Skills	-10.7%
Physically safe		No data
Positive empowered responses = 7	Participating	+ 6.0%
	informed life choices	+ 10.6%

Year 1 Methods

A slightly different approach was taken to analyse survey data for the programme in year 1 due to the low levels of survey responses overall. There were multiple cases of one project completing 'pre' surveys but not 'post' surveys and therefore we used all the data with consent and conducted non-paired analysis. Therefore it is not possible to directly compare the results of the programme-level quantitative analysis from year 1 with year 2 and 3.

Methods for Year 2 and Year 3

Paired methodology

Paired t-tests to determine changes between pre and post on paired data only- applied in Year 2 and Year 3

Original method

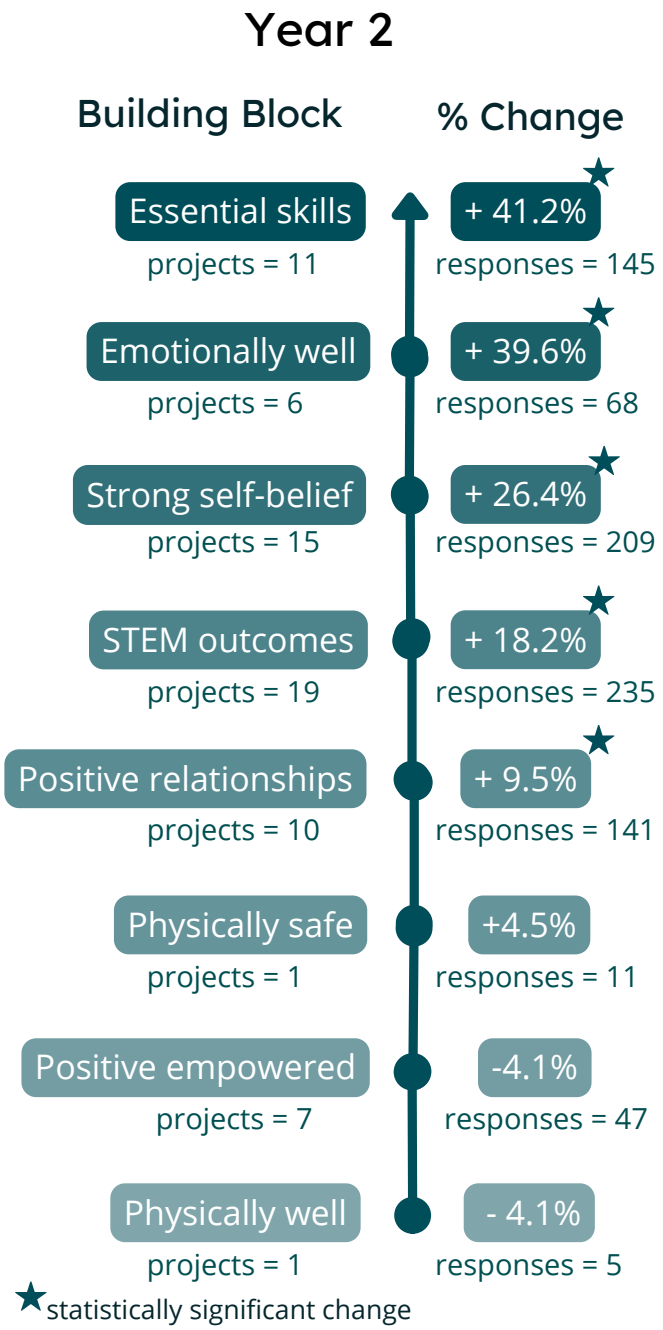
Cohort analysis to review the % change, non paired analysis - applied to Year 1 and Year 2

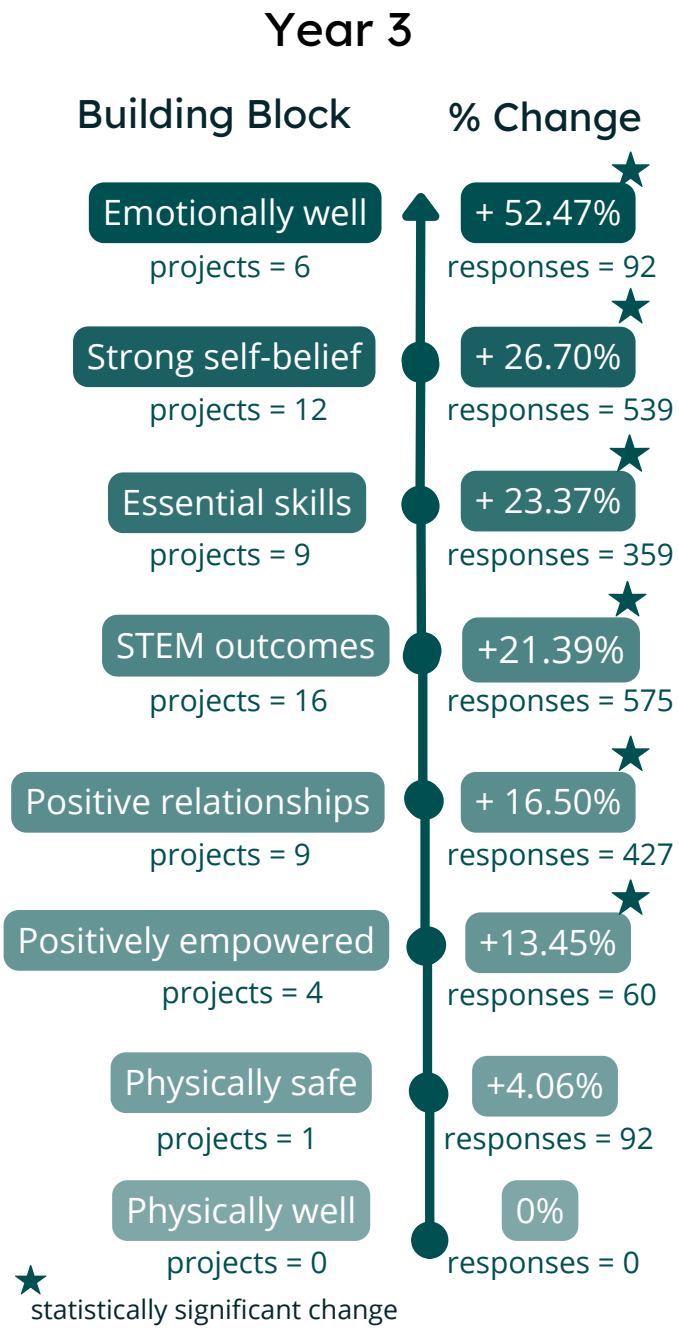
New method

Reviewing individual paired data to understand % change and then creating an average- applied on Year 2 and Year 3 data- this analysis is presented in this report only.

Paired t-tests were completed the same in Year 2 and Year 3, and therefore the significance of the results in Year 2 does not change. The new method of analysis presents a more efficient way in which to look at the data.

Building Block Comparisons Over Time





Overview

In year 2, 242 useable surveys were collected with comparable survey data pre and post the project. Year 3 saw more than twice as many useable surveys (575). This uptake in engagement with the evaluation is due to numerous factors including: increased investment from the projects as a result of receiving individual evaluation reports; projects becoming more efficient at data collection and understanding the value of gaining insight into their impact on participants.

In year 2, 19 projects were contributing data and in year 3, 16 projects were contributing data. It could be argued that the more committed projects have continued to contribute data and also increased the number of survey responses. This highlights the importance of working with fewer projects more closely in order to gain quality impact data.

Building Block Comparisons Over Time

Year 2 and Year 3 comparison

Essential Skills, Strong Self-belief, Emotionally Well and STEM outcomes were the Building Blocks which recorded the largest percentage changes which were also significant in individuals in year 2 and 3. This finding was also illustrated in year 1 (although not directly comparable).

Overall, **year 3 data presented a higher % change in the individuals compared with year 2.** The exception is Essential Skills which was the highest % change in year 2. More projects reported on the Essential Skills Building Block in Year 2 than Year 3, but a higher number of respondents were in Year 3. In Year 3, the emotionally well Building Block was the highest % change. When reviewing the raw data, the respondents had a emotional wellness score of 3.26 which increased to 3.79. In Year 2, emotional wellness score was 2.9 and improved to 3.54. This suggests that the average emotional wellness score began lower in year 2 than year 3.

STEM outcomes have repeatedly year on year produced a positive % change between pre and post. Over time, the number of responses to the survey has increased and therefore provided a better confidence that the increase is reflective of the participants.

Strong Self-belief has remained a consistent impact on the individuals over Year 2 and 3, producing around 26% increase between pre and post surveys. Physically Safe has a small % change but is not significant and is the bottom three Building Blocks for most impact. Physically Well has not improved in both years. There were only a small number of projects that were investigating these Building Blocks and some projects did not submit data. More data would be needed to make conclusions as to whether the projects had an impact in these Building Blocks.

Finally, Positively Empowered increased in number of responses and % change between Year 2 and 3. The number of projects reporting between Year 2 and 3 has decreased from 7 to 4, but this shows the benefit of working with reduced projects who are more committed to collecting data more intensely, rather than lots of project who are less responsive.

Qualitative Comparisons Over Time

Due to a slightly different approach to qualitative data collection and coding in Year 1, and the significant challenges posed by the COVID-19 pandemic, this comparison focuses on **Years 2 and 3**.

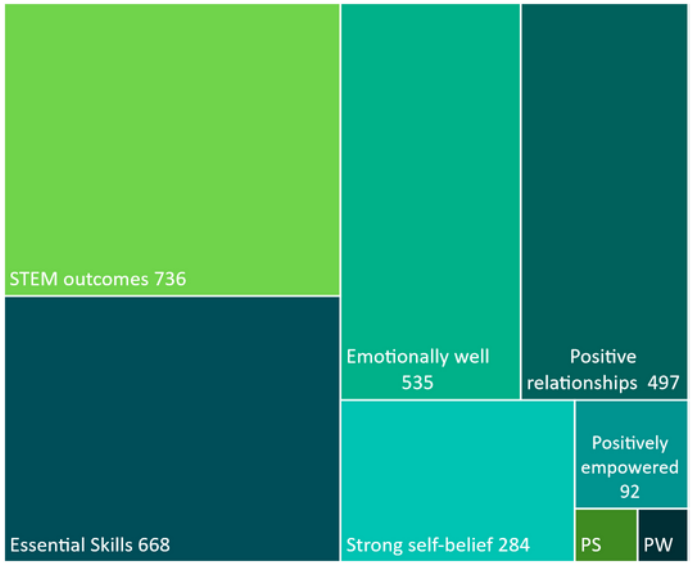
These two years paint an **overall similar picture** in terms of the distribution of qualitative references to different Building Blocks.

STEM outcomes are the most commonly coded Building Block in both years, followed by a slightly different ordering of Emotionally well, Positive relationships and Essential skills. Strong self-belief and Positively empowered emerged again less commonly from the analysis, and there are only relatively few coded examples of Physically well and Physically safe.

It is important to note that the much higher number of qualitative files in Year 3 (602 compared to 128 in Year 2) did not lead to a higher number of coded references. This is due to several reasons:

- There were many more pictures of specific activities (see next page). These tend to result in fewer coded references because they speak to fewer Differences, compared to text files for example, or show the same activity multiple times.
- Submitted files were not always accompanied by explanations of contextual information which at times made it harder to code for specific Differences.
- In light of the vast amounts of submitted files, the evaluation team also adopted a slightly narrowed approach to coding that focused slightly more on very concrete examples in the qualitative files.

Year 2



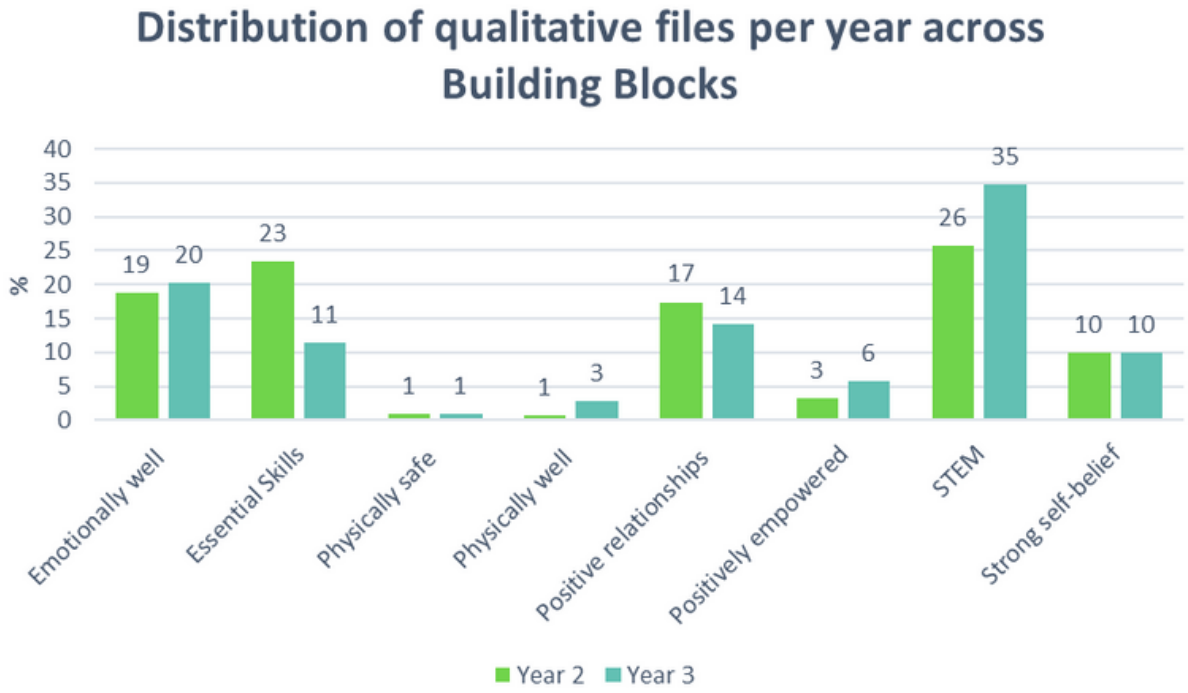
Year 3

Qualitative Comparisons Over Time

The slightly different coding approach means that a direct comparison between both years in terms of absolute numbers is limited. This is very common when working with qualitative data. Instead, it is more instructive to compare the relative proportions of the Building Blocks that emerged from the qualitative data.

As the bar chart on the right shows, the relative percentages of coded qualitative files is **overall fairly consistent across both years**. The main exception is the lower proportion of coded examples relating to essential skills in Year 3, and a higher share of STEM-related codes. These observed differences might be due to actual changes in project activities or simply due to the submitted data. On the whole, this comparison of relative coding frequencies suggests an **overall robust approach.**

Year 3 saw a much higher number of uploaded **pictures and videos.** Projects also continued to implement and adapt interactive data collection tools introduced by the evaluation, such as “Head, heart, feet” or “Stones in a pond”. There were also some data collected by **Peer Researchers** who interviewed other young people or wrote short participant observation reports. Projects also submitted blog posts or reports, as well as reflections from staff members.



Tracking the Same Individuals Over Time

What is a longitudinal participant?
Individuals who had attended their project in both year 2 and year 3, and provided full consent and pre/post surveys for both years, were classed as longitudinal participants.

How was their data used?
We compared their pre survey Year 2 with their post survey Year 3 to see the impacts of their attendance over multiple years. The individuals were also included in the Year 3 analysis.

What changes did we see in longitudinal participation?
6 projects submitted data which had longitudinal participation between year 2 and year 3. There could be other projects that did not submit the required data between year 2 and year 3 to identify longitudinal participation.

In total 52 participants were longitudinal participants and five Building Blocks were analysed. Development of Essential Skills showed the highest change, followed by Positive Relationships and STEM outcomes. Emotionally Well showed a small negative change, which was not statistically significant. This small decrease is likely due to a small number of high baseline values for some young people and does not represent a general assumption of negative impact. Similarly, overtime individuals may have developed more essential skills with age, and therefore may have shown an impact without participating.

Is it more beneficial to stay in a project for more than one year?
Longitudinal participants showed a higher percentage change of Essential Skills and Positive Relationships between those who just participated in year 2 or year 3. Other Building Blocks were variable or showed a decrease when longitudinal in comparison to year 2 and year 3 data.

Building Block	% Change	
Essential skills	+ 36.13% ★	
projects = 6	responses = 25	
Positive relationships	+ 24.06% ★	
projects = 6	responses = 31	
STEM outcomes	+ 19.29% ★	
projects = 6	responses = 52	
Strong self belief	+7.33% ★	
projects = 6	responses = 50	
Emotionally well	-4.2%	
projects = 6	responses = 15	

★ statistically significant change

Tracking the Same Individuals Over time

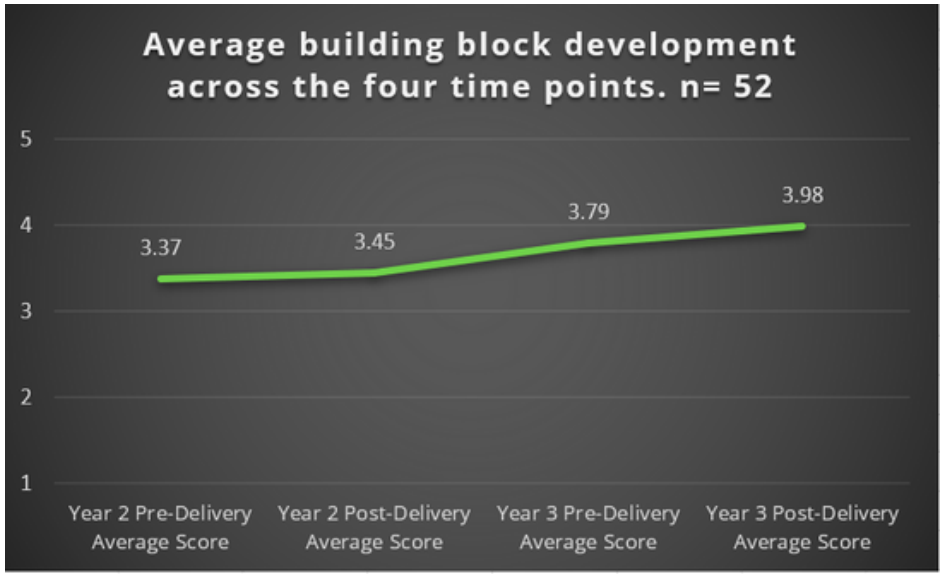
The previous page showed statistically significant change between the 52 young respondents' baseline scores in Year 2 and the post-delivery scores in Year 3 along several Building Blocks. In addition, it is also useful to view their **development over all four time points**.

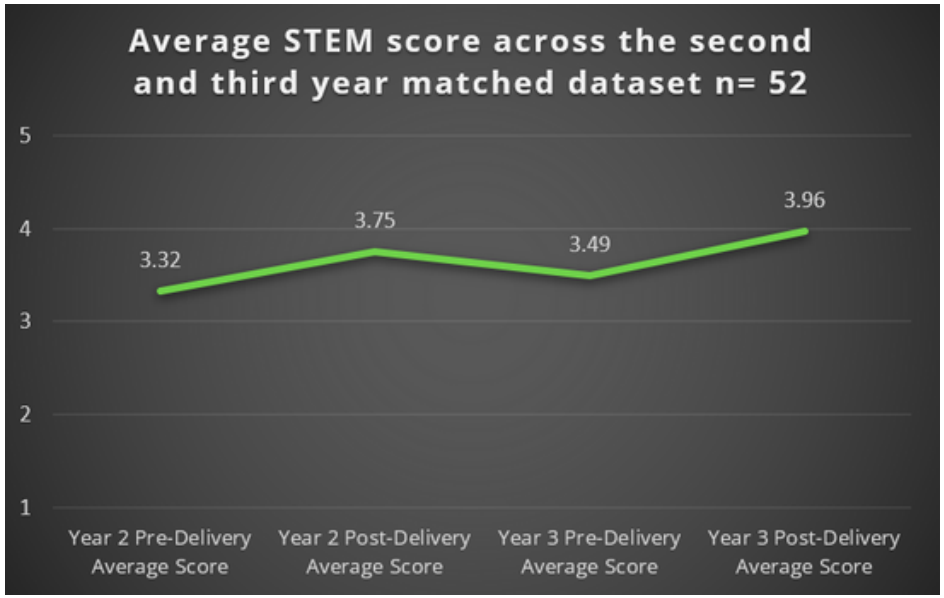
The line chart on the upper right shows that the average combined scores of all these young people showed a **general upward trajectory**. There was also a further and quite substantial score improvement between the end of Year 2 delivery and the Year 3 baseline. These data **do not allow any causal statements** on the effect of Curiosity involvement. But it might still importantly hint at **possible positive and lasting effects of a longer-term engagement with Curiosity projects**.

The chart showing only the STEM average scores shows a slightly different development. Here the average scores went down between the two years. But there are **two positive developments**:

1. The Year 3 baseline was still higher than the Year 2 baseline.
2. In both years, young people improved their scores quite significantly during the project activities, ending on a Year 3 score that is even higher than the Year 2 post-delivery score.

Also, the STEM development might point to **potential benefits of a sustained and longer-term involvement in ISL project activities**. If the drop between Year 2 and 3 could be confirmed with more data, this might support calls for funding to cover longer periods or even ongoing involvement of young people cohorts in ISL projects.





SECTION 5 - Reflection and Conclusions

Project Engagement and Building Evaluative Capacity

Since the start of the evaluation, the quality and volume of data generated at project level has improved markedly year on year.

The evaluation team worked closely with all projects throughout the programme through an embedded researcher model. This involved one member of the Substance/Graphic Science consortium being dedicated to supporting projects individually through developing supportive relationships on a more individually required basis. In addition to this tailored and personalised approach to support, the evaluation team sought to create a programmatic, collegiate sense of being part of a Curiosity family.

This close level of support was crucial in enabling the projects to maximise the amount of data they were able to collect, which in turn allowed them to demonstrate the impact of delivery on young people.

YEAR 1

25
PROJECTS

OVER
180
YOUNG PEOPLE

SOME QUALITATIVE EVIDENCE

149
SURVEYS ANALYSED

YEAR 2

24
PROJECTS

OVER
425
YOUNG PEOPLE

128
QUALITATIVE FILES ANALYSED

242
SURVEYS ANALYSED

YEAR 3

23
PROJECTS

OVER
820
YOUNG PEOPLE

565
QUALITATIVE FILES ANALYSED

575
SURVEYS ANALYSED

"Sometimes evaluation was like trying to fit a square into a circle so it was liberating not to be confined with the evaluation. Now we are able to think about how to evidence impact. Some families were worried or skeptical about form filling, this was a barrier. The approach was unstigmatizing, much more relaxed and we were able to evidence the impact another way."
-Project Lead

Project Engagement and Building Evaluative Capacity

A major project outcome articulated in the ToC is upskilling and capacity building of the youth and ISL sectors through helping them develop the skills to demonstrate the distinctive role of ISL in delivering youth outcomes. Their ability to understand and reflect on what works and articulate this story is crucial to the achievement of Programme ToC LTO1, that being 'funders recognize the value of ISL in delivering youth development and make more funding available'.

The embedded researcher model not only ensured high quality and volume of data collection, but also enabled projects to **develop understanding and skills in demonstrating impact**. The result is an **increase in capacity to self-evaluate** and apply critical reflection across these (and other) youth projects.

Two critical elements in achieving this outcome were:

1. Close project support from the evaluation team and BBC CiN, to provide specific support to project staff where required;
2. The flexibility of the programme and data collection methods, whereby projects were able to adjust delivery plans and data collection where necessary.

Overview

- Dedicated project support from a named researcher
- Relationship strategy between evaluation team and projects agreed and co-created
- Online secure data sharing portal introduced
- Simplification of a reduced number of four core qualitative tools
- Evaluation Methods Training Webinar February 2022
- In person reflection and learning Event at Media City January 2023.
- Online celebration and feedback hosted by Director of CiN September 2023.
- Support and encouragement to collect evaluation data in alternative ways where relevant
- Programme flexibility to allow changes in delivery when faced with challenges

"the flexibility and support we have received has been fantastic" [Project Lead]

Whilst the use of the suite of qualitative tools was encouraged, projects were also supported to collect qualitative data in alternative ways if more relevant to their delivery model. Many projects did this, highlighting the successful role of innovation in data collection and the confidence building that this approach created. For example, some projects provided feedback through podcasts, video clips, and other novel methods. It was then the role of the Evaluation Team to codify and make sense of what this rich, varied qualitative data meant in relation to the outcomes framework.

"We really liked the 'head, heart, feet' tool and others in the organisation like it and use it with other projects" [Project Lead]

Developing Young People as Ethnographers

The Youth Voice element of the Curiosity evaluation was introduced in Year 2 and expanded throughout Year 3.

Young people were trained as **Young Research Ambassadors** by the evaluation team and through cascaded training from their youth lead workers. They were taught research skills including how to lead and facilitate interviews and focus groups and develop a suite of questions important to them.

The evaluation team actively encouraged the young people to generate questions and theories to test based on their own perspective, experiences and understanding of the project. As such, these young people took on varied roles such as young collaborators and co-designers of research.

They also learned skills to engage groups and develop conversations. These social research techniques provide further valuable skills for the young Research Ambassadors and **increase confidence through their leadership role and achievement.**

"The young people now help shape the projects which is good but 'messy' and youth-led." **[Project Lead]**

"We were really inspired by the peer researcher role work." **[Project Lead]**

Picture by Research Ambassador

Research Ambassador reflecting in their participant observation report: the best thing for young people in the session was "Being creative and coming up with their own ideas. Drawing because it is calming."

Research Ambassador to their peer: "Why do you like to do [science projects]?"
Answer: "Because I like learning."

What is Distinctive about Informal Science Delivery? (ISL)

The Curiosity programme is distinctive in that science is used as the vehicle to achieve youth outcomes as defined in the Differences Framework. In year two it was becoming apparent that notions surrounding **acceptance of failure, nurturing exploration and continual adaptability** were evident from data collected throughout the programme. It is noted that that the word fail is often referred to as a '**f**irst **a**ttempt **i**n **l**earning' in youth education circles. To develop an understanding of what specifically about science led engagement is achieving this, evidence collected from across the programme was used to explore this across 4 key themes, here described by our FAIL framework. This was inspired by a key feature of engaging with science and becoming comfortable with failure through various components.

F Friendship and connections

A Achievement and Aspirations

I Independent and Interested learning

L Life Skills

Friendship and Connections

The collaborative nature of science related delivery across the Curiosity Programme has resulted in young people achieving differences relating to positive relationships, emotionally well, and strong self belief. Working as team, through problem solving during an experiment, or choosing an activity, encourages connections to be built - not just between peers, but as demonstrated across the programme, with trusted adults and family members too. This is strengthened by the informal nature of science in the Curiosity programme, as it excludes the rigid structure of the school environment and allows connections to grow organically. 'Failing' something with a peer allows collaborative learning, and the need to persevere with the support of your team.

Achievement and Aspirations

Science delivery is distinctive in that 'failure' is also an achievement - learning from failure allows science to progress and evolve. The Curiosity Programme allows achievement to be redefined, and removes the formal forms of achievement more commonly measured in young people in the school environment.

The wide range of science topics covered by Curiosity Projects has allowed young people to be exposed to all types of science related roles and experiences, through visits to museums, learning about different jobs, and trying various things for themselves. This has had a huge impact on inspiring young people to engage in science, now and in their future. The less formal approach has also helped use science as a tool to challenge young people's perceptions of what they can and cannot do.

What is Distinctive about Informal Science Delivery? (ISL)

"I've learnt not to be scared to fail but failure is a way of succeeding" - YP

Independent and Interested Learning

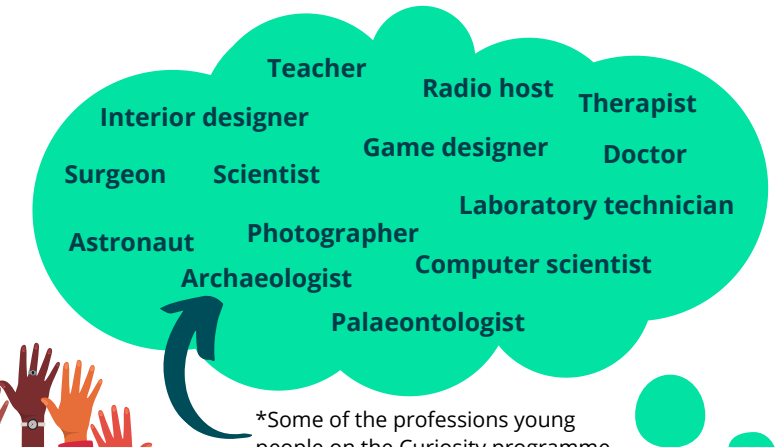
Many Curiosity projects focus on researching a topic of interest and developing a way to present it back - through designing a magazine, presentation or podcast, for example. By encouraging young people to independently research and present their findings, the informal nature of the Curiosity Programme nurtures natural interests, in contrast to the formal school curriculum. Projects also support a more creative and 'playful' approach to science, which helps young people gain confidence in learning outside of school settings. Evidence from across the programme has demonstrated achievement of differences such as Strong Self-Belief, Positively Empowered, and Emotionally Well. Experiencing failure while engaging with a topic of genuine interest can inspire young people to try again, and maintain their curiosity in the topic.

The FAIL framework allows us to think about the unique nature of STEM engagement with young people. Aspirations for the future* (and improved engagement with education or training as a consequence) is a key feature of the framework that has been demonstrated through collection of qualitative evidence across the programme.

"Young people's confidence can sometimes initially be knocked when doing activities as they don't always get the outcome they expect or desire. This is a fundamental part of science and through doing activities over several weeks young people have realized that if you change something or come at it from a different angle, you will eventually get the result you are looking for. This applies in many aspects of life and shows that not everything works at the first attempt, but perseverance and determination will lead you to an answer."- Project Lead

Life Skills

The practical nature of informal science delivery has allowed Curiosity projects to utilise a hands on approach, whether through cooking, craft or outdoor sessions. Physical experiences allow young people to develop science knowledge in direct context. As a consequence much evidence has been found across the programme demonstrating young people acquiring practical skills that are applicable in their daily lives - for example, reading instructions methodically, or using equipment safely. 'Failing' while developing these skills in the safe space of a Curiosity project allows young people to develop confidence in utilising these skills, and ensuring that skills are developed safely and securely. Increased resilience can also be achieved - when topics are conceptually difficult, young people need to take time to understand and develop their ideas, overcoming challenges along the way.



*Some of the professions young people on the Curiosity programme aspire to be, following engagement with their project (from qualitative evidence)

Spotlight: One Young Person's Curiosity Journey

"One of my favourite moments of the project has been my experience working with a young person who nearly quit school due to poor attendance. It transpired that they had low literacy levels and dyslexia which hadn't been picked up by the school. Their 'truancy' had been labelled by the school as a 'behaviour' issue, when in reality they struggled to read and felt embarrassed. This young person was really interested in bugs and creepy crawlies and had listened to podcasts about the impact that insects have on plant life, animals and human health. They wanted to learn more but acted as if they didn't. They loved comics as seeing pictures helped them infer what the text said and quite frankly, comics seemed like a safe space for them.

They initially attended sessions and would sit in the back reading comics, but always seemed interested in what was being said. Over time, they started to engage with an Entomologist who was finishing their PhD on Malaria net modelling. Their entire demeanour changed and they opened up about struggling to read/getting his words mixed up.

From this, we developed a reading program for him around his interests which we married with our intro to comics AQA. After 12 weeks his reading age improved by 5 years and his thirst for knowledge just grew and grew.

He felt more confident to attend school and asked for research papers to read about bed net modelling. His teachers noticed a marked improvement and he got a B in his GCSE science paper. The difference in his approach to learning made his teacher change his predicted grade. It just blew my mind!"

[Young person story by Curiosity Project Lead]

Spotlight: Youth Outcomes

It is worth highlighting a number of specific outcomes that were recorded throughout all three years of the evaluation. Young people expressed developments that were quite often in addition to the specific differences that projects had chosen to work towards.

Mental Health and Wellbeing - Linked to Emotionally Well
Qualitative evidence has demonstrated a strong link between improvements in areas such as peer relationships and feelings of aspiration and self esteem with improvements in mental health and wellbeing. The informal science delivery model adopted by Curiosity projects, focusing on collaboration, building resilience when things 'fail', and aspiring to develop knowledge and skills has resulted in young people demonstrating improved wellbeing as a result of engagement.

There have also been indications from multiple projects that becoming engrossed with activities that involve 'making things work' leads to emotional wellbeing outcomes such as respite from anxiety, finding joy, perseverance, and resilience. This includes finding a 'state of flow', which is a mental state in which somebody is completely involved and focussed on what they are doing. Flow is associated with numerous psychological benefits such as increased creativity, positive affect, performance, and emotional regulation.

Physical Activity - Linked to Physically Well
The informal element of the Curiosity programme's science delivery has resulted in some topics being explored outside of the 'classroom' environment. For example, Warrington Youth Club's learning on ecology and the natural environment involved a nature walk and a trip to a local nature reserve. Getting young people outside and moving increases their physical activity, and improves their connection to nature and their local environment.

Local connectedness - Linked to Strong Self-Belief and Physically Well
Activities in the local environment such as observing and exploring nature linking to feeling connected with the area and building a sense of place, which was particularly important during the pandemic when the young people's worlds had changed drastically. The nature activities appeared to be very grounding in this context.

"If you're having doubts on trying projects like this, just do it, its fun and interactive with time to allow you to work more independently too. I'm quite shy but have made so many few friends and the skills you learn are so cool." [Young Person]

Spotlight: Youth Outcomes

Leadership and responsibility - Linked to Positively Empowered
Curiosity projects engage with all different types and ages of young people, and are able to provide some with positions of responsibility. One avenue to achieving this was the implementation of the Research Ambassador programme, which asked young people to get involved in the evaluation of their Curiosity project. This involved young people conducting interviews, group discussions or session observations, with support from the Substance evaluation team and project delivery staff. The RA programme was designed to incorporate 'co-production', whereby young people were given autonomy and responsibility to co-design their approach. The development of leadership skills and sense of responsibility that this provides is an important unintended outcome that has reach far beyond the Curiosity programme in terms of its impact on young peoples lives.

Community development and confidence - Linked to Strong Self-Belief
Specifically one Curiosity project lead explained how one young person has gone on to volunteer and develop their confidence skills through the work done by Curiosity:
“So, [the young person] came to the project for football. But even then, they always worked to go home and to just stay away from everyone else, to be sitting at the side on his own. And like I said, he got more involved, and we did the youth voice leadership programme. Since then, they’ve been involved in Curiosity and got more confident with that. And on the educational side and they’re really bright and likes reading... So, since the leadership programme and Curiosity [18 months ago] they’ve gone on to do 1200 hours of volunteering and was recently named St Games Volunteer of the Year for under eighteens. And like, they’re only 13, you know, 1200 hours even by an adult is so amazing. But by a 13 year old child who still in school, you know what I mean? And like I said, the leadership skills and confidence they’ve developed since coming here is incredible.”

“I noticed the young person become very confident and independent in making their own video of a science experiment. They voiced over the footage explaining what they were doing (at the same time as doing the experiment!) and edited an amazing video. It was great to see this young person create something like this, and it is great knowing that they had the confidence to do this.”- Staff reflection

“I have learned that i can work and communicate with others and develop relationships without being afraid of getting judged.”- Young person

Conclusion and Legacy: The Projects

The evaluation of Curiosity programme took the youth sector projects involved on an journey of learning. The evaluation has demonstrated that the learning journey upskilled the staff in three key areas:

1. Developing the skills to and rationale for delivering informal science learning alongside their other core youth provision in order to engage existing young people in new ways and reaching out to non-engaged young people through a varied new offer.

2. Providing staff with further insight, confidence and ability to articulate the story of change on participants through varied data sources and lenses and see evaluation as a productive programme management and improvement mechanism as well as one of accountability.

3. Attracting new cohorts of young people from their localities, who would not usually engage with projects, with a new varied youth offer speaking to different interests and needs.

The Chief Executive of BBC CiN addressed the Curiosity Project leads and the Evaluation Team at an end of programme celebration webinar. In his speech he noted that at the very beginning of the Curiosity timeline it seemed daunting to bring STEM into the youth work arena. BBC CiN had a strong commitment, “for children and young people to thrive and be the best they can be through the powers of positive relationships.” Chief Executive, Simon Antrobus himself worked as a youth worker early on in his career and acknowledged that the youth work profession is guided on the principle that ‘someone believes’ in the young people and is there to ‘open their eyes to new and interesting opportunities’. The idea that engaging more young people who are otherwise underrepresented in STEM or have not had a positive experience with science in the past was seen as an important notion for CiN around equality of opportunity, social justice and influential on young people’s health and wellbeing.

The Chief Executive concluded:

“It is an important moment to mark with this significant piece of work. We want to learn for the evaluation and insight which has been incredibly important. We are able to demonstrate that STEM can work achieve positive outcomes and young people can benefit which is fantastic news.” [Simon Antrobus. BBC CiN Chief Executive. 19. 09.2023]

Conclusion and Legacy: The Research Landscape

Curiosity was founded on the idea from Wellcome Trust and BBC CiN that there was a space for 'Science for Development' in the youth work landscape. The idea that through informal and relational channels, ISL can open up pathways for young people who otherwise would not have considered STEM as a subject was one aim, but the ability STEM and ISL have to channel wider youth outcomes was also interesting to the founding investors. Those leading the programme initially at Wellcome Trust saw a value in exploring whether there were some distinctive or interesting features surrounding the delivery of ISL that might be "**particularly valuable for some young people and might offer some points of learning that other practices don't offer in quite the same way**" [Matthew Hickman. Former Wellcome Trust Curiosity Programme Lead].

Wellcome Trust may have its links to the STEM community but it felt that through partnering with a leading children's and young people charity their reach into underrepresented communities would be achieved. For Wellcome, BBC CiN brought with it access to grassroots youth community groups who work with young people with varied interests, support needs and situations.

Dr. Kath Edgar @KathTwemmers · Apr 12

Just presented at the Public Communication of Science and Tech conference alongside @BBCCiN and @GraphicScience showcasing three years of research on the wider impact of informal science learning on young people. #PCST2023 Great confidence and ideas being shared.

Dr Jackie Bell, FIMA, FHEA (she/her)

Through a mix of tailored, flexible yet robust evaluation methods it has been possible to confidently demonstrate the role informal science learning delivered in a youth setting has on both STEM and wider youth outcomes. The CiN's own Differences Framework was tested and the results identified statistically significant change in almost every outcome area. In April 2023, the Substance/Graphic Science Evaluation consortium worked alongside BBC CiN and other leading Science Communicators to present at the Public Communication of Science and Technology Conference in Rotterdam. At this influential international academic conference in the field of science communication, feedback was obtained from some of the leading voices in science communication from across the world on the Curiosity programme and evaluation.

Conclusion and Legacy: The Funding Model

Through demonstrating the approach taken in the UK by BBC CiN's Curiosity programme, others reflected on the model:

"We have done some similar work with other community groups when STEM is just one part of the delivery. Some of the experiences being described are similar in that it is positive when STEM is not the main focus and the whole experience is important." [UK. ISL practitioner]

"We lead a wider programme for... young people with a focus on the science. We do recognise the importance of not focusing on the STEM and actually deliver this by the back door and doing something else." [Netherlands. Science Festival Lead]

Substance & Graphic Science's youth-led and flexible approach to evaluation was also reflected on by peers from outside the UK:

"Working with young people in USA to assess science exhibitions with young people using personal mini-mapping. They write down their experience and pre-post drawings to show how they are connected to nature. This shows the positive impact and what pro-action they can do themselves which is important as the USA has recently introduced free-choice learning." [USA. ISL practitioner]

"It can be difficult to collect data due to trust issues, so we can't do surveys. We might do some observations and PhD students do some interviews with projects leads to gain insight." [Israel. ISL practitioner]

Curiosity has succeeded in helping thousands of young people achieving youth outcomes through engagement with informal science learning. The youth organisations involved have benefitted from a new suite of engagement tools and the confidence to deliver ISL to a wider cohort audience. The majority of projects have a desire to continue with a legacy Curiosity programme post-funding due to the associated benefits of the delivery model:

"Staff we have supported have learnt a lot about other roles the organisation can have around pastoral support and the wellbeing side. Some autistic young people were reluctant to come into the centre and now come in and really engage with the science compared to our arts and crafts. Staff are more open to this now in the organisation and will take forward regular trips, STEM days in our centre and active-STEM projects." [Project Lead]

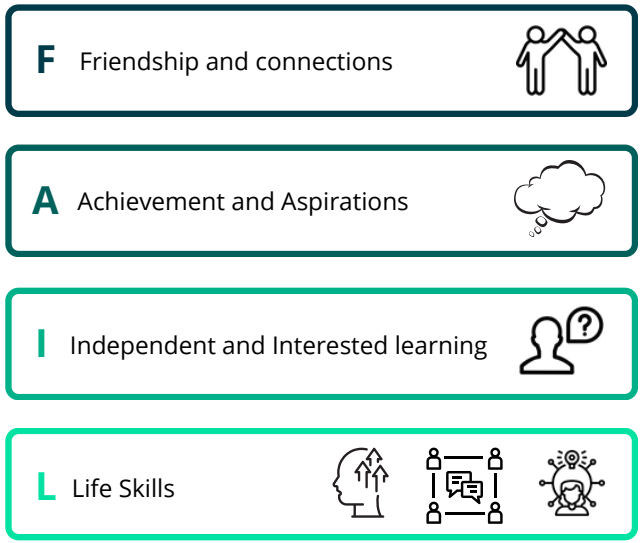
Conclusion and Legacy: ISL

There is a growing momentum globally not only in delivering ISL to young people experiencing challenges and issues, but in ensuring that their voice is heard around many STEM related issues including climate crisis, sustainability and local ecology.

Wider scale initiatives such as the 'Make it Open' programme delivering to 150 schools around Europe are creating and sharing STEM learning and activities for teachers to use more open play such as playground physics. Elsewhere the Levers programme, a multi-stakeholder alliance with shared aims around climate justice is being delivered in non-formal community settings by 11 projects across nine countries. Learning Ventures design and deliver transdisciplinary project-based learning for climate and justice for environmental care across arts and other sectors in formal. Young people in this context are providing Youth Voice and dialogue with the government around climate crisis.

The Worlds Largest Lesson, a partnership between UNICEF and UNESCO, is considering approaches to make the Sustainable Development Goals more accessible for young people. The learning across many of these initiatives, Curiosity included, is that for ISL and STEM delivery to have the most meaningful impact on a wide range of underrepresented young people it needs to embrace principles of the FAIL frameworks established by the evaluation team in 2022, and:

FAIL Framework



- Ensure the project is **youth led** and includes topics that interest and resonate with them
- Remember **enjoyment** drives learning and engagement – keep it joyful and fun
- Provide it in **emotionally safe environments**
- Introduce topics in a way that **do not overwhelm** but that build optimism and resilience
- Ensure there are **trusted adults** and **peer to peer** learning opportunities

Stakeholder Reflections on Legacy

"I want the legacy to be that we have lifted understanding in the space up, and that there is some practice that is being built on and used in appreciation of it as a mechanism for improving young people's lives, and that people are prepared to use and develop it within their own practices"
[Head of Insight - Impact / BBC CiN]

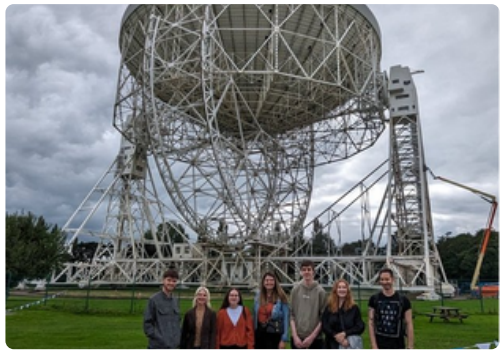
"I think not only has this project given young people the chance to meet other people like them, but to also find and develop skills that will give them so much in their lives."
[Local Community Liaison Manager]

But one thing was about one objective was really about in gaining understanding of the potential role of ISL in improving on people's lives. That hadn't made been explored to the that degree in this way yet, and trying to get more youth organizations to choose an ISL delivery tool. But ISL organisations adopting new the engagement strategies as well. That the [youth sector] see this particular tool, which is our informal science learning, but don't fixate on that tool. Just focus on the outcomes that it's trying to achieve.
[Former Wellcome Trust Lead]

"I'm really interested in science as a career now but I kinda struggle to learn in school due to my dyslexia and dyspraxia.... It made me feel so much better ..So for me, I've learned how I learn best. Breaking things down by making comics and seeing things laid out has really helped me know what type of learner I am. Dr Natalie says I have a visual brain and see things a bit differently than others but it's a bit like a superhero power. If I draw things out I remember them better."
[Young Person]

Reflections on the Evaluation

The Substance and Graphic Science evaluation consortium held monthly evaluation programme management meetings throughout the duration of the programme. At these meetings a number of important reflective processes took place:



1. Monthly data audits to gauge project level interaction with both quantitative and qualitative elements
2. Assessment of and RAG-rating of project level issues
3. Action plans for tailored support where required to ensure projects have all the information they need to contribute to the evaluation
4. Updates from embedded researchers on case-study progress and evolving findings
5. Updates on buy-in and support needs of the Young Research Ambassadors

Reflections on the Evaluation

Towards the latter phase of the evaluation period qualitative coding of project files began across the team using NVIVO software. Once projects had submitted all survey data each project level analysis took place.
Through considering the wealth and depth of data collected from the youth sector, it can be concluded that the flexible, tailored and adaptive approach to evaluation was successful in achieving its original goals. The year on year improvement in data quality and volume is testament to the embedded research approach, the flexible arrangement and the buy-in from youth project leads.

Challenges and improvements to be considered in any future youth/ISL evaluation:

- The value of the grant awarded needs to proportionally represent the investment required in the evaluation ask. As such **a proportional sampling methodology can be applied where grant value relates to evaluation ask.**
- Dedicated **resources in terms of finance, training and support is required to allow for an already stretched youth sector to fully engage in evaluation** in paid for staff time. Evaluation and project delivery needs financing.
- **Youth Voice needs to be adopted from the outset** as to ensure young people are instrumental in all evaluation design and can influence evaluation and project design.
- Young people need to be **appropriately rewarded for the time engaged in the evaluation** and this needs to be a relevant reward for that demographic/cohort. This transaction needs to be built into evaluation plans.
- The need to **allocate sufficient time to code vast and varied qualitative data** sources is important as this aspect of data analysis is extremely labour intensive.
- The quantitative data records the change in individual responses between pre and post-surveys. To gain honest responses to what could potentially be perceived as sensitive questions by the participants, **a trusted relationship is needed between the young person and the staff** providing them with the questionnaire. If these trusted relationships have not been established, participants may be more inclined to give false survey data which may report higher scores in the pre-survey, such as a higher physically safe pre-survey score. It could be theorised that if the pre-survey is taken when trusted relationships have been established, more accurate/honest data will be provided.

Reflections on the Evaluation

Highlights and key take-aways from reflections on the evaluation approach are:

- Importance of **co-creation in evaluation tool development** with project staff and beneficiaries.
- **Pilot and testing phase** is crucial to refining the evaluation approach.
- Allowing **projects to define reporting outcomes** which are subsequently costed against an evaluation framework results in tailored and project relevant deliverables.
- **Providing a safe-space for projects** who make-up the wider programme to share ideas is important. This safe space can be on-line and in-person.
- Responding to **local level project needs** is important as to not view the evaluation as a one-size-fits-all but a flexible approach.
- Dedicated named **embedded researchers to support projects and build up trusted and open relationships** is instrumental in creating buy-in and uptake of evaluation asks.
- Not dictating paper based or form based questionnaire's where young people and parents are wary of data gathering and doing so may hinder project relationship building phase.
- Providing a training programme to **upskill young people as Young Peer Researchers** is important and brings wider youth outcomes with it in addition to the project delivery youth outcomes.
- **Upskilling the youth sector through building evaluative** capacity not only allows the projects to demonstrate the impact of this grant but can be used to describe change across wider project delivery. This can support project sustainability through attracting new funding streams via evidence based proposals.
- Demonstrating **impact change through multiple lenses** (young person, parents, project staff and researchers).
- Performing statistical analysis which allows for reliability scores and statistical significance of change to be identified.
- Apply the same rigour of analysis to qualitative data as applied to quantitative data to ensure for frequency of themes to be identified through rich, varied, qualitative data.

CASE STUDIES

Curiosity Case Study

Abraham Moss Warriors

Project Overview

Abraham Moss was formed in 2000 by June Kelly MBE. The club describes itself as a multi-cultural club at the heart of the Community CIC. Abraham Moss use sport, technology, and the arts to develop young people into the best person they can be and support positive changes and experiences for young people in their community across Cheetham and Crumpsall North Manchester.

The Curiosity Science Program has weekly Informal Science sessions that are facilitated from various 'science experts' individual's from Manchester University to youth social enterprises.

The project itself works with young people aged 5+ from the community with young people having high levels of deprivation and poverty. The aim for participants are outcomes Essential skills, positive empowerment, strong self-belief and STEM.

Methods

Online Session Observation
Substance attended an informal science learning session on energy.

Interviews
3 interviews with project staff
1 interview with young person's parent

Focus groups
Young people focus group and reflection session.

Core qualitative tools
Head, Heart, Feet reflections and other staff feedback

Science Delivery

Abraham Moss Warriors were already using science in their delivery sessions. NASA and the Mission X project is a perfect example of the work Abraham Moss Warriors was already doing and has strong links with the British Space Agency. Curiosity was a perfect opportunity to allow the continuation of this work and fund further science learning for the young people who wanted it. The science delivery sessions encourage as much practical skills as possible, which has been facilitated through Abraham Moss' extensive networks. Experiences such as go karting, den making in the peak district, and learning and creating inventions such as the Rube Goldberg machine that Substance observed are experienced, with delivery takin place either in person, online or on a day out of Manchester. The staff engagement strategy is informal, focused on building relationships with the young people but also the families too. Abraham Moss warriors encourage everyone in the young person's life to engage with support.

Results - year 3

Outcomes - Abraham Moss Building Blocks

1) Essential skills

Staff, young people, and parent's of young people in attendance of the project all reported a wide range of skill development throughout the Curiosity programme. These include practical skills such as understanding how electric cars work; learning to record and run a science podcast, and developing and working as a team to build a sensory garden. Project staff and parents also discussed how the creativity and varied experience in Abraham Moss gave the young people ambition to go on and try new experiences. On a wider level, both young people and staff gave examples of leadership, collaboration and communication as general essential skills being developed part of the Curiosity project.

2) Strong self-belief

Participants reported that they took a lot of pride in their personal achievements. Staff saw this pride as increasing their own expectations for later life in making decisions about further education and employment. Staff discussed a young person who, at the start of attending the project had no interest in completing their GCSEs, but through attending the programme found a love for engineering and passed 10 of their GCSES and went to university to follow their passion for mechanical engineering.

3) Positively empowered

The young people themselves described aspects of their own ability that surprised them when it came to informal science learning at Abraham Moss. Project staff describe how using a scientific process pulls them out of their 'comfort zone' to try new challenging tasks and experiences for their own personal growth.

> ***"we did science and learning about go karting and learnt all about electric cars, I didn't realise how much power was in a car and that's what really got me interested in cars and how things work"***
> *- Young person (focus group)*

> ***" We want the kids to make choices themselves and to be creative and to think well, OK, I've tried this, and I can learn from this experience"***
> *- Project Lead (Staff interview)*

> ***"[young persons name] social interaction has improved a lot. So has their motivation, especially in science. They are always drawing models and not just drawing, there are pieces of paper and sticks all over the house! [laughter]***
> *- Parent of young leader (Parent interview)*

> ***"When a young person has confidence in what they're doing, especially in STEM, young people develop strong self-belief "***
> *- Project lead (Staff Interview)*

Additional Outcomes

Staff described the influence of the Curiosity Science project on other work that they deliver, and also with the young people themselves. Youth leaders have developed from Curiosity from Abraham Moss and have undertaken tasks such as volunteering, and peer research to help guide their community and services for best practice.

Not only the young people, but the staff themselves have developed as youth workers in Curiosity. The delivery model keeps both the young people and the staff on their toes as the activity and delivery styles change with each week. For example. young people and staff have both had to learn about lab safety and the learning journey was shared under the guidence of the science professional brought in for the weeks Curiosity project lesson.

Results - continued

Outcomes - other Building Blocks

Abraham Moss had the three key outcomes of: essential skills; strong-self belief, and positive empowerment. But other areas were also described by project staff and young people. Building positive relationships and emotional wellbeing were described.

1) Positive relationships

As shown in a few quotes on this page, staff and young people all describes a development of various positive relationships. More specifically project staff and parents discussed the development of positive role models for the young people. The specific referral process and young people who attend the Abraham Moss Curiosity Science Programme means that a lot of young people who attend are in need of support and role models who see the value in education, science and STEM skills are invaluable.

2) Emotional wellbeing

Young people and staff discussed the value that having a community and safe space such as Abraham Moss, and more specifically the Science classes. One activity that staff discussed was their walks in nature, not only did this build on other skills developed in other sessions, but the staff saw this as a great exercise to "help develop relationships and wellbeing", while learning about their natural environment. This, combined with an encouraging and praise based approach by the staff contribute to their self-worth, belief and wellbeing.

> ***"Coming here has been great for me, I don't like sport too much so it's good to have a place I can come after school to hang out with friends and do something for me"***
> *- Young person (focus group)*

> ***"I've loved learning about Science, like going to new places like NASA. It's given me a chance to make friends too"***
> *- Young person (focus group)*

> ***"You know, I didn't like science when I was younger. And I always think that the work we're doing in Curiosity is something that the youth sector has really missed out on. We are steering young people's development through STEM and also sort of opening up those soft skills, like confidence, and opening up their development as people. "***
> *- Project lead (Staff interview)*

> ***" As a parent, obviously it's like a great opportunity for me because my daughter she is academic. But I wanted to see her enjoying it and applying it and think it's interesting. So as a parent, I was conscious of this. And I have seen that build in her interest of science and to me, that's mainly because it's different to the way kids learn about it in school, in much more of an informal environment but with a lot more hands on experience."***
> *- Parent (Interview)*

> ***"I feel like this [Curiosity] has inspired me to be more interested in space"***
> *- Young person (focus group)*

Reflections

Role of Informal Science Learning (ISL)

How has ISL achieved these outcomes?
Science in the Curiosity programme is used as a tool to exploring the world and developing young people's skills and abilities. The science elements of the session inspire young people's confidence in learning and their belief to try again. as well as other social benefits such as peer relationships and independence. One staff member outlined the importance of resilience that science provides, in that, when topics are conceptually difficult, young people need to take time to understand and develop their ideas into key skills through their own, guided experiences.

What is unique about ISL
For the young people and parents at Abraham Moss, it is exploring scientific topics that have been learnt in school in a more informal way that allows other skills to develop. This holistic approach develops skills in addition to more academic benefits related to STEM aspirations and the confidence a young person can have in learning.

"All of our young leaders are all part of the science program. It's kind of an add on to what we're doing as part of curiosity. So we're teach them the science and give them the fun side of things but then we give them the opportunity to become leaders within that and and that's really pulling out all of those skills within them if that kind of makes sense. "
- Project lead (interview)

"Abraham Moss is in a very built-up area where we are with they only have like 1 grass park in the whole area where we're based. It gives kids the ability to go get their freedom to run around and to do things and being fresh air, the kids love going to the Peak District, they love exploring the world and you know it makes them naturally more inquisitive, they can relate things they see to the previous times they went to the countryside through Curiosity, and for many young people in this project, they aren't able to go to the countryside an awful lot, if not, at all. "
- Project staff (staff interview)

Success and Challenges

Successes: Abraham Moss' Curiosity science programme has navigated various local issues with gang culture and violence over this last year to still successfully deliver young people informal science learning across Year 3. Positive change has been highlighted by young people, staff and parents around the BBC CiN Building Blocks.

Challenges: Due to the various local issues, capacity has been an issue in Abraham Moss. Specifically around survey data collection, which meant that Abraham Moss were unable to provide data for quantitative analysis around their key Building Blocks. Fortunately the data collected across the case study provides qualitative understanding to the great work that takes place in this programme.

Next steps: While the Curiosity grant funding is coming to the end of the three year cycle, Abraham Moss have been using a science for development model with young people since 2015 and will be very well equipped to carry out this practice after this third and final year.

Curiosity Case Study

University of Birmingham

Project Overview

Researchers from the University of Birmingham's Centre for Applied Psychology have developed the Science 4 Friends workshops to explore the science behind emotions with young people, and to help them improve their social connections, confidence and wellbeing.

The project is distinct in its delivery: the project leads are also the Informal Science Learning staff. They have delivered the activities in three different youth hubs in Birmingham (All Saints Youth Project; The Pump; The Hub).

University of Birmingham have run multiple cycles of activities across these youth centres, with up to 10 young people per group. With an explicit focus on inclusivity, young participants are aged mainly between 11 and 16, and some have special educational needs.

Picture taken by young peer researcher

Science Delivery

Science 4 Friends has offered a variety of activities and workshops on the science behind emotions. Amongst others, these included building brains with play dough and learning about how brain parts and neurotransmitters work; sessions on understanding, prompting and managing emotions; and reading facial expressions. Delivery has taken place in small groups of young people. For the most part, groups were open for any young person to join. The engagement style was characterised by patience, understanding, trust and the aim that every young person gets something out of each session.

Methods

ISL Staff interview
Interview with ISL staff / project lead

Staff interviews
Two interviews with youth workers (All Saints Youth Project, The Pump)

Peer Research
One young person carried out a participant observation, took photos and wrote a short observation report

Session observation
Substance attended and participated in an ISL session (5 CYP, ages 11-21). The session focused on building a brain with play dough and discussing cognitive functions

Results

Outcomes

1) Positive relationships

The friendly and open atmosphere in the youth centres, and the interactive nature of the sessions, led to young people forming stronger relationships. They enjoyed opening up and discussing how they felt about things and why. One young participant wrote in a reflective piece:

"Having a good way to talk about mental health in a constructive way with people I like spending time with has been helpful."

2) Positively empowered

Young people felt more capable of managing their emotions and challenging situations independently. They had fun learning about and testing coping strategies in playful ways. Young participants were also able to co-design sessions and select topics in which they were most interested or which they found most useful.

3) Strong self-belief

Young participants gained more confidence to take part in social life and community. Sessions also furthered confidence and self esteem by gently pushing CYPs' comfort zones, and by combining individual and group work. The young peer researcher described the activities in a session on coping strategies like this:

"[Working] alone but we helped each other out when we were stuck on what to write."

> ***"We did a session on how emotions and stress affect the brain. Here's how to cope: 1. control breathing; 2. go on a walk; 3. be mindful; 4. distract; 5. ground yourself."***
> *- Young person (Reflective piece)*

> ***"I can speak out in front of a group of people I don't know."***
> *- Young person (Stones in a pond feedback)*

> ***"This specific group, I've got closer to through having discussion. And I feel like with this specifically being about emotions and mental health, that matters a lot more because it's an intimate topic, and that's how you get close to people"***
> *- Young person (Semi-structured interview)*

> ***"I can control my anxiety by doing relaxing activities."***
> *- Young person (Stones in a pond feedback)*

> ***"The fact that a lot of the activities are kind of unique and a bit different to what they might normally do pushes them out of their comfort zone a little bit."***
> *- ISL staff / Project lead (Interview)*

Additional Outcomes

The project lead delivering the sessions aimed to also improve young people's teamwork, creativity and critical thinking. Sessions encouraged young people to solve puzzles and discuss in teams, and to come up with new approaches. Activities also challenged them to use artistic skills, which was often new to them. The project lead reflected: **"It's really nice to see them have a little bit of confidence around that, and it's not about how good you are. It's just about trying it out and giving it a go, and then producing something at the end."**

Results

Role of Informal Science Learning (ISL)

How has ISL achieved these outcomes

Understanding the science behind their emotions has helped young people explore new ways of managing their mental health and improving their confidence and self-belief. Learning about how emotions manifest in the body, and viewing these as normal reactions, also helped them to discuss these topics openly in the group. This, and many sessions' teamwork activities, enabled new social connections and friendships.

What is distinctive about ISL

Creative problem solving activities and playful approaches to science questions helped young people gain confidence in learning outside school settings. Young people were also actively involved in the development of the science activities, which were constantly improved with young people's input. An important aspect of ISL is the development of critical thinking. Being able to think about things in a different way is a valuable skill for young people to overcome everyday challenges. **"If you can think about things in a different way, you can think about things in a way that's more helpful to you than less helpful"** - ISL staff / Project lead (interview)

"It's useful that all of the sessions are done in a different way, that they are accessible for all sorts of different young people ... each session is different and is honing in on a different skill."
- Youth worker 2 (interview)

Brain built with play dough

"I always see friendships forming. And especially because the activities focus around mental health, I feel like it gives them an opportunity to speak about these sorts of things when they might not necessarily bring them up in the main youth group."
- ISL staff / Project lead (interview)

"I think what it did is, it broadened their understanding of what science can entail ... It can be about the more intricate things. It can be about discussion. And the more that they got involved in the project, the more they learned that and they said, 'Oh, this could be a future career for me'."
- Youth worker 1 (interview)

Summary and Reflections

The initial session plan was to keep the same young people in each group for several weeks. But as young people's regular attendance posed a **challenge**, sessions were soon opened up to allow young people to join whenever they were present. This meant a partial re-design of activities, so that no previous knowledge was required. This flexibility proved useful for delivering sessions tailored to the different dynamic across all three youth hubs.

A main **success** was creating stimulating and playful approaches to scientific and critical thinking that was very different from school lessons and had practical takeaways for young people's mental wellbeing. The team at the University of Birmingham also aimed to make their work more sustainable by providing training on the ISL on emotions to more than 50 youth workers from the Midlands and beyond. Youth workers designed their own ISL activities and improved them with input from the young people they work with.

Curiosity Case Study

Getting Better Together

Project Overview

Getting Better Together (GBT) are a community organisation based in a small town in North Lanarkshire, Scotland. They run a healthy living centre and range of community activities such as a community garden, a cycle development programme, an active travel programme, a community radio station, early years programmes, and youth programmes, including a youth forum, sports, and music programmes.

GBT recruited a youth worker with a background in science to lead the project. This Science Support Youth Worker worked in partnership with Dr Kirsty Ross, a public engagement with research professional, and the Clyde River Foundation, a research and education charity based in the Clyde river catchment.

The project aims for participants to build strong self-belief and improve essential skills.

Methods

Participant interviews
Interviews with 5 young people attending the project

Staff interviews
Two interviews with project staff and ISL partner

Core qualitative tools
Stones in a Pond, Head Heart Feet reflections and other participant and staff feedback

Peer research
2 peer researchers conducted interviews and observations

Science Delivery

Through the Curiosity programme GBT ran a weekly science club for 9-13 year olds, as well as producing radio and podcast episodes where young participants interview researchers. The weekly science club took a drop-in format, similar to their traditional afterschool youth club sessions. Participants usually conduct a new experiment or activity each week. Some sessions were supported by the Clyde River Foundation or visiting researcher support, and others facilitated by the Science Support Youth Worker.

The participants often suggested or shared ideas for future activities, with club members voting for which they would like to try first. Content and topics of the sessions varied, although a theme around 'everyday science' such as experimenting with cooking or baking, or which involved familiar aspects such as fire, ice, or 'household' ingredients, were popular.

Results

Outcomes - GBT Building Blocks

1) Strong self belief

Staff and project participants described several aspects of building strong self-belief. Confidence and self esteem, and pride in personal achievements are the two most commonly described aspects.

Staff describe how emphasising the exploratory nature of science, and that there's 'no silly questions' has contributed to several aspects of increasing confidence, for example with conducting science activities, asking questions, and meeting new people such as different researchers, as well as a general confidence in themselves.

Talking about the activities they have done with peers, introducing activities to the club and project staff, and filming videos of themselves conducting and explaining the science activities, are two key aspects linking to pride in personal achievements. These have had further influence, whereby the club and GBT as an organisation have welcomed new participants due to hearing about the club from their friends.

2) Essential skills

GBT aimed to work towards two aspects of essential skills through their project: communication skills and practical skills.

Better communication skills are described in their own right, but also as an enabler for other outcomes seen such as improved collaborative working, and friend and peer relationships.

Practical skills gained range from learning how to use equipment such as microscopes and cameras, how to keep safe in certain situations, and other elements such as video editing, measuring, weighing, and heating or cooking. Being able to express ideas and creativity is also described.

> *"So how do you feel when you're going to start a new activity or challenge?" [Interviewer]*
> ***"I mean I get really excited, like those CD discs [activity], that one literally made me feel that I can do it"***
> *- Young person (interview)*

> ***"I overcame feeling anxious about coming to something new which I don't know anything about"***
> *- Young person (Stones in a Pond)*

> ***"It's sometimes that personal turnaround, which is really, I always love when this happens, when they're like, 'that doesn't work for me'. And they're like, 'look, I'll show you how I did it' and they'll help them and I just love when they do that"***
> *- Project lead (staff interview)*

> ***"I noticed the young person become very confident and independent in making their own video of a science experiment. They voiced over the footage explaining what they were doing (at the same time as doing the experiment!) and edited an amazing video. It was great to see this young person create something like this, and it is great knowing that they had the confidence to do this."***
> *- Project lead (staff reflections)*

Results

Outcomes - other Building Blocks

Positive outcomes in other Building Block areas were also described by project staff and participants. Building positive relationships and emotional wellbeing, as well as the STEM type outcomes, were commonly described.

Positive relationships

Participants and staff described development of a variety of relationships. Building friend and peer relationships are described through the collaborative problem-solving nature of the informal science activities. Science club members are described as having built a 'club mentality', bonding as a group and helping one another.

Emotional wellbeing

Having fun and enjoyment, and managing feelings and emotions are the two most commonly described aspects of building emotional wellbeing.

Managing feelings and emotions in particular is linked to disappointment experienced when an experiment did not result in the expected outcomes, and perseverance and resilience needed to problem solve and try again.

STEM type outcomes

A number of STEM-type outcomes were identified, often linking to other Building Block areas. Aspects such as improved collaborative working, problem solving and perseverance linked to the role of failure were all key areas.

> ***"I saw it, it was really fun. And when I started I never, I didn't know anyone, then I started to know everyone"***
> *- Young person (interview)*

> ***"So my mum said like, it's science and I thought to myself, maybe it might be boring. So then I gave it a shot to go and then as soon as I came in it was already fun. So then that's why I keep on coming...so now I'm always coming here 'cause it's very fun"***
> *- Young person (interview)*

> ***"we were doing a drop test and wait. Oh yeah, it was last weekend. That one was really hard because I had to do it over and over again"***
> *- Young person (interview)*

> ***"They feel quite protective over that group. Which means they feel like they've got an ownership...They've helped the ones who are maybe a little bit quieter, they just befriend them and it just goes from there. And it's been great"***
> *- Project lead (Interview)*

Additional Outcomes

Project staff describe receiving requests for science activities from other groups and clubs at the centre, having heard about the activities and experiences of science club participants.

The Science Support Youth Worker has facilitated science activities within other clubs and sessions, and has curated resources and provided support for other team members to facilitate science activities where she has not been able to. However she describes other staff members' confidence with science activities as low, preferring her to facilitate the activities where possible.

GBT have also developed a strong connection with their ISL partners which they hope to continue after the Curiosity programme funding has ended.

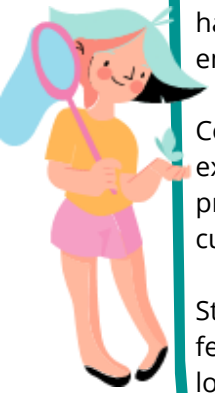
Results

Role of Informal Science Learning (ISL)

We have described some aspects of how conducting informal science learning contributes to achieving the outcomes above. GBT describe several key distinctive aspects of conducting informal science activities for youth development.

As noted above, collaborative problem solving, a key element of conducting science activities, leads to outcomes such as developing strong self-belief, essential skills, and positive relationships.

The role of failure, and freedom to fail within informal science activity has also been described as a key part of managing feelings and emotions, and building perseverance, confidence and resilience.



Conducting informal science is also compared with science experienced within formal education, which is not seen to be able to provide the safe space and freedom to fail due to pressure of the curriculum and tests or exams.

Staff also describe the science activities as providing a mechanism to feel comfortable discussing other things, and a way of engaging with local YP who were not interested or didn't feel comfortable joining their other groups.

> ***"the kids went from being afraid to try it in case it failed, to coming out with a, 'eh, it's science, it doesn't always work. Let's try it again'. You know, the change in confidence was really noticeable between the, because my kids are the same, you know, they're often scared to fail. School stuff is usually set up so it's guaranteed to work because they've got such limited time in the curriculum for things to not work. And so this was a space for experiments to fail or things not to work quite right"***
> *- ISL partner (interview)*

> ***"it's just getting across that message as well that not everything works on first try. It might not turn out how you thought it would, but you might be pleasantly surprised by a different outcome or you might be angry or disappointed, but then you can always try again. So it's that kind of freedom to fail thing that's came across...it's been great to see actually, they've been like, 'okay, that didn't work. Let's try this instead'...And it was all these different ideas were coming, which was good. And the ones that didn't work, they were like, 'oh it didn't work but it's okay'...when some of the people first started, it just would go pear shaped and people would get upset because things didn't necessarily turn out as hoped right away"***
> *- Project lead (interview)*

> ***"it's been good to get to know a lot of the kids quite well and it's a kind of mechanism for other discussions to take place"*** *- Project lead (Interview)*

Summary and reflections

This project demonstrates not only that youth development outcomes can be achieved through conducting ISL activities, but that ISL activities contribute to youth outcomes in distinctive ways. The process of conducting science activities (exploration, creativity and collaborative problem solving) in a space where YP feel safe, supported and ownership, away from pressures or requirements of formal education settings are described as key contributors to this.

GBT hope to continue facilitating science activities at their centre, not only with existing science club cohorts, but across their sessions. They describe funding as the main challenge to this, with the ISL partner commenting "How can you expect long-term outcomes if you only provide short-term funding?". GBT have recently received funding confirmation that will allow them to continue and build upon this work.

Curiosity Case Study - update

Knowle West Media Centre

Project Overview

Knowle West Media Centre (KWMC) is an arts centre and charity based in the Knowle West estate in South Bristol. They use technology and the arts to develop creative solutions to problems and support people to make positive changes in their lives and communities.

In the Curiosity funded Future Legacy project, KWMC partner with Stemettes, a social enterprise which supports girls and non-binary young people to aspire to careers in Science, Technology, Engineering, and Maths (STEM).

The Future Legacy project works with young women and non-binary people aged 16-18 to create their own digital social action projects. They deliver a series of workshops and a residential retreat, as well as support from a mentor. Through this, they aim for participants to increase emotional wellbeing, develop essential skills, and become more positively empowered.

Methods

Video Diary Room
11 project participants responding to question prompts

Staff interviews
Five interviews with project staff

Core qualitative tools
Head, Heart, Feet reflections and other participant and staff feedback

Observations
Informed by year 2 project observations

Science Delivery

KWMC's science delivery focuses on the scientific process, highlighting the skills and qualities used for this and how they can be applied in many ways. They deliver STEAM activities (STEM with the arts), highlighting the creativity in STEM, and how science is used in creative projects. They support their participants to develop social action campaigns through development sessions that include practical skills such as coding, website design, UX/UI design skills, digital embroidery, app development, as well as sessions focusing on critical thinking, emotional wellbeing, problem solving, and resilience.

A major element of the project takes place on a residential retreat, which provides the time and space for the young participants to engage and develop away from challenges in their daily lives, and the opportunity to build connections in a supportive environment.

Results - year 3 update

Outcomes - KWMC Building Blocks

1) Emotionally well

During year 2 we saw that the opportunity to collectively learn new skills, and feeling able to enter their 'stretch zone' to try new things and overcome challenges contributed to the confidence and emotional wellness of participants. In year 3, being able to manage feelings and emotions, and being curious and have an enjoyment of learning were the two most commonly mentioned aspects of being emotionally well.

The importance of creating a safe and supportive environment to enable this was emphasised in year 3. The nature of ISL in being able to explore without pressure or stress to succeed is described by both project staff and participants.

2) Essential skills

Project staff and participants reported a range of skills development throughout the programme. These included specific practical or technical skills such as learning to use laptops, how to code, and 3D printing. Linked to this, participants reported their confidence in learning and using new skills developed. Project staff also describe how the context and format of the project led to participants being able to express creativity.

Communication, collaboration, and leadership skills were some examples given of more general essential skills being developed through the project. Project staff described an example where two participants started the programme feeling very shy, and stating that communication was something they would like to get better at. These participants took their skills further by deciding to direct a short film together, displaying both practical and interpersonal skill development.

3) Positively empowered

The most commonly described aspects of being positively empowered were participation and expressing self; motivation and achieving goals; and participation in social action. Staff described how using a scientific process to try new things contributed to participants then feeling able to push themselves to try other new things. Participants described intentions to continue, and staff described post-project interactions at events where participants have shared what they have been able to do since participating in the project.

> ***"Here, you're not getting marked on it, no one's going to judge you"***
> *- Young person (Video diary)*

> ***"In secondary school I barely spoke, now we're speaking in front of a camera"***
> *- Young person (Video diary)*

> ***"It is easier to make friends, talk to people, everyone's so nice"***
> *- Young person (Video diary)*

> ***"Sharing my project idea felt really good so I will share more in the future "***
> *- Young person (Head, Heart, Feet)*

> ***"When a CYP feels emotionally well, they're able to push themselves into [their] stretch zone and have the confidence and ability to try new things and explore a wide range of opportunities"***
> *- Project staff (Written reflection)*

> ***"I think that [the project] allowed for them to be even more creative and ready to take risks"***
> *- Project staff (Interview)*

Results - continued

Outcomes - other Building Blocks

Positive outcomes in other Building Block areas were also described by project staff and participants. Building strong self-belief and positive relationships were commonly described.

Strong self-belief

Increased confidence was the most commonly mentioned aspect of building strong self belief. This was described both as an outcome itself, and through building confidence, an enabler for achieving other outcomes.

Pride in personal achievements, and increasing horizons and expectations for self were also commonly mentioned. Staff described these elements in particular in relation to this age group making decisions about their future education and careers, giving examples of young people (YP) who had felt able to apply for and participate in roles they otherwise wouldn't have considered previously.

Positive relationships

Project participants and staff described development of a variety of positive relationships. Building friend or peer relationships was the most commonly mentioned. Relating to trusted adults, inclusion and belonging to communities were also described.

YP often described feeling shy or that they didn't expect to be able to talk to other YP and make friends at the start of the project, but this was a key highlight area when reflecting on their experiences. Finding other YP with similar interests was a key part of this.

> ***"Confidence is my favourite skill I have learned so far"***
> *- Young person (Video diary)*

> ***"with the support of my new friends and the encouragement and guidance from the group leaders, I was able to overcome a fear of mine and help create something amazing"***
> *- Young person (Blog)*

> ***"I digitally embroidered a tote bag with our [project] logo on it. It took me a few tries to get right but I got it in the end and it looks really cool, so I'm quite happy with that"***
> *- Young person (Blog)*

> ***"I wish I experienced it when I was younger. When you show young people the things that they think are out of reach and actually like gonna be really hard and you introduce them to them, they sort of, it sort of changes your outlook in the world. Cause you're like, okay, well this really big thing coding, like I thought was gonna be really difficult, but it wasn't that [difficult], maybe you're more inclined to do other things that you wouldn't necessarily be confident in initially. So I think the science aspect is so important cuz it's like a vehicle I guess to sort of opening up those soft skills and opening up like opportunities and development"***
> *- Project staff (Interview)*

> ***"a lot of [YP] were saying like, I never thought I'd be able to do something like this and achieve something like this in such a short amount of time"***
> *- Project staff (Interview)*

Additional Outcomes

Staff described the influence of the project on both other work that they deliver, and on themselves. Specifically, the importance of an evaluative and reflective process in bringing learning to other activities was highlighted. Examples were given about how the project is influencing how other projects engage with the same age group, as well as influencing the nature of activities delivered with other age groups.

In terms of personal influence, staff described how some of the outcomes they explored with the participants, they also felt themselves. For example, learning new skills and feeling more able to overcome challenges, such as when adverse weather meant it was not possible to go on the retreat, which had to be rearranged. Some staff also described how their own perceptions and attitudes to science had changed throughout the process.

Reflections

Role of Informal Science Learning (ISL)

Again, staff described how through processes of trial and error and creative problem solving, participants were able to push themselves out of their comfort zones to try new things, and through this built feelings of confidence and empowerment. They also identified some nuance around ISL processes being beneficial to different groups in different ways:

It was felt that ISL activities enabled some YP who wouldn't normally participate in more traditional youth work activities such as sports or performing arts to also experience youth development outcomes such as building positive relationships, emotional wellness and strong self-belief.

For all, it was felt that increasing confidence in their own participation abilities through discovery and exploration led to a can do attitude which translated more widely: 'If I can do this, what else can I do'.

Underlying this outcome development is the importance of providing a safe space where participants feel comfortable to have a go, push themselves, and try new things, away from formal education pressures and stresses of exams and prioritisation of success. This is linked to mutual trust and in many cases, mutual discovery and development of both YP and youth work staff exploring and learning together.

> ***"I feel like actually what we do is just create a space where the young people can explore and they have the tools to be able to explore. And by doing that they learn all of these essential skills"***
> *- Project staff (interview)*

> ***"I think this allowed them to like really cement their knowledge and understanding of STEM, social action, creativity, but in a much more informal environment, which actually led to much more sophisticated and developed knowledge and understanding because they had, were having such a different experience to what they were having in school"***
> *- Project staff (interview)*

> ***"they found their people...one of them said to me like, I didn't think I'd make any friends. I thought I'd sit here and not say anything. And they were super shy and it took them so long to to open up. But I think once they actually realized that, oh, these people are actually a bit like me. They like all these like weird and wacky subjects that maybe, you know, people in my school don't really like, they like talking about coding and technology...and they just flew"***
> *- Project staff (interview)*

> ***"you don't always get a supportive funder and support from [embedded researcher] around how to kind of improve it, you know, learn. We have evaluation skills, but actually through [researcher] support and being able to ask different questions or think about different processes, we've been really able to have that space to build the program"***
> *- Project staff (interview)*

Summary and Reflections

The past two years case study work with KWMC and their Future Legacy project has not only shown that youth development outcomes can be achieved through ISL activities, but how ISL contributes to youth development outcomes in distinctive ways.

Following the COVID-19 pandemic, a greater emphasis on rote learning and exam revision in formal education is described as producing an even greater need for projects such as this, where participants have the opportunity to build elements such as emotional well being and strong self-belief through exploration and collaborative problem solving in supportive, informal environments.

Reflecting on the funding programme itself, and the process of delivering the project, staff praised the flexible, supportive nature of the grant funders which enabled them to deliver the project in a way and at times that were felt to be the most appropriate and impactful. Support around evaluation and reflective approaches was also valued as an enabler to improve this and other work KWMC deliver. They produced a short film about the project which can be viewed here.

Curiosity Case Study - Light Touch

North East Autism Society

Project Overview

North East Autism Society is a large regional charity in the north east of England. The charity employs over 1000 staff and have 45 different sites in which they base their operations. The vision for the organisation is to support autistic people and their families to ensure the best possible outcomes for themselves. The service was characterised by the project lead as “for all, yet have a focus on children and young people” with empowerment and development at the heart of everything they do.

The Curiosity Science Program has weekly Informal Science sessions that are facilitated from various ‘science experts’ individual’s from across Universities and various social enterprises in collaboration with the Life Science Centre in the North East.

The project itself works with young people with autism, aged 8-16 years old. The aim for participants are outcomes Essential skills, positive empowerment, positive relationships and STEM.

Methods

Interviews
3 interviews with project staff

Interviews
1 interview with Community Liaison manager at Life Science Centre

Core qualitative tools
Head, Heart, Feet reflections and other staff feedback

Science Delivery

North East Autism Society (NEAS) and their collaboration with the Life Science Centre has meant that face to face science clubs and online zoom sessions with the partners “Life” have run effectively and helped provide connection, not only with other young people but also to STEM. By having the facilities at the life science centre, the experiences the young people have has meant that the transition between informal science learning and school science teaching is seamless and provides the young people with expectations for both school and vice versa.

The junior science lab was the first type of activity that the Life Science Centre ran for NEAS before Curiosity. Once the Curiosity funding application was successful, this was adapted to a monthly hands-on science session. When online sessions took place however, activities were sent to individuals beforehand or adapted to include things around the house, in an aim to make sessions as accessible as possible.

Results - year 3

Outcomes - North East Autism Society Building Blocks

1) Essential skills

From staff interviews, there was a wide range of reported essential skill development in the Curiosity programme. Young people were able to replicate experiments from the demonstrations they were shown either online or in-person, and also asked and answered questions on the the scientific topics . One staff member said that “this group of young autistic people were effectively doing bespoke science activities”. In reflections this was seen as having a huge benefit for the young people’s confidence and ability to see themselves in STEM positions in the future.

2) Positive relationships

Staff were clear to say that the relationship building Curiosity has provided for the young people was key to the success of the programme as a whole. Young people were able to make friends and get comfortable in a space that resembles the science classroom at school. This is key for young autistic people who need routine and safe space. Due to the chances the Life Science Centre provides, after the six month Curiosity programme, a lot of young people carried on science learning with their friends in the centre.

3) Positively empowered

From interviews, it was clear that the Curiosity programme for NEAS places huge importance on empowerment. Individual’s discussed the development of connections and seeing other young autistic people which, for many of the young people, may not have happened before. This led onto young people feeling comfortable enough to “wander into the Science Centre” and to engage with individuals, which in turn has developed the young person’s belief in what they can do.

> ***"the young people who have been who have been part of the science club are are now featuring more often in the [life] centre activity. So they do the science club activity and now that they're actually confident of the new environment. They're finding their way of doing something else [in the centre] as well. So there's kind of a legacy which is amazing really"***
> *- Project lead (Staff Interview)*

> ***“ then you would get feedback about that area of science. And this was about building their confidence and given them the belief and understanding that when they told us a view, we would be listening to it, whether whether it was good or it was bad, we would be listening. And as part of that”***
> *- Community Liaison Manager (Staff interview)*

"I’ve loved making friends and learning about nature"
- Young person (qualitative reflection tools)

"I want to be a scientist when I’m older"
- Young person (qualitative reflection tools)

Additional Outcomes

Staff described the influence of the Curiosity Science project on the network it provides for the parents of the young people. The parents themselves created an unfacilitated support group while waiting for their young people person and were able to come together once a month and share experiences of care duties and support. But also the positive stories they have been having with their young person. This network is a powerful and unintentional outcome of Curiosity and is a great example of NEAS supporting counter-narrative group sessions on the topic of autism.

Reflections

Role of Informal Science Learning (ISL)

How has ISL achieved these outcomes?
Science in the Curiosity programme is used as a tool to exploring the world and developing young people's skills and abilities. Science was described by both the staff and the young people from the qualitative feedback tools as the common interest between the young people that encouraged conversations and gave the young people a unifying topic to build friendships around.

What is distinctive about ISL
For the young people and staff at NEAS and the Life Science Centre, it is exploring scientific topics that have been learnt in school in a more informal way that allows other skills to develop. This holistic approach taken by NEAS has also helped use science as a tool to challenge the young autistic people's perceptions of what they can and cannot do.

"One amazing part of the Curiosity children in need project has been their comfort with developing the role of a peer researcher in line with autistic people and accessible research in general. This has meant one young person has stayed with us to do risk assessments, and peer researcher projects which has massively increased their confidence and given them experiences in research with a big name like the BBC."
- Project lead (interview)

"One young person that I feel reflects a lot of the young people we have in the Curiosity Project is [name here]. They came to Curiosity at a time where they were struggling not only with poor mental health, poor peer relationships but also self-injurious behaviours. Because of this they weren't able to attend school and out of school sessions too. Their parents brought them to NEAS due to their deep love for science. They were able to take part in something they loved with the knowledge and emotional support around them to allow access and comfort. I feel like that's the most important part of NEAS and the curiosity programme with the Life centre, is that it's like a family for a lot of these children. "
- Project staff (staff interview)

Success and Challenges

Successes: Due to the success in NEAS a young person from the original cohort and members from NEAS and Life Science Centre have been speaking at a number of conferences, both nationally and internationally about the partnership between NEAS and the Life Science Centre. This experience for the young person provides numerous essential skills for development and positive empowerment in what they can achieve.

Challenges: One of the main challenges for the Curiosity programme on NEAS was maintaining a closed and safe space whilst providing the young people with the tools needed for their science activities at home. This meant that in order to equip the young people with the tools for their experiments, parents had to be engaged and maintain conversation with the staff at NEAS and the Life Science Centre.

Next steps: While the Curiosity grant funding is coming to the end of the three year cycle, NEAS and the Life Science Centre have been using a science for development model with young people before the Curiosity funding and will be carrying on their partnership for the foreseeable future.

Curiosity Light Touch Case Study

Warrington Youth Zone: Project Metaphor

Project Overview

Warrington Youth Zone's key goals are to support young people's development, and offer opportunities to gain and increase skills, self-awareness and confidence. They do this through their wide range of programmes aimed at different age groups. The facility itself is a purpose-built state of the art facility for Warrington's young people, aged from 7-25. The team that works for the Zone is around 120 people, providing support for 6000 young people in the area.

Project Metaphor itself uses science experiments and themes in STEM to explore feelings, challenges or worries young people may have. For example, this year project delivery staff managed to relate non-Newtonian fluid to never judging a book by its cover!

Methods

Peer researcher
Scrapbook and video diaries of Peer Researcher experiences.

Staff Interviews
Project lead and delivery staff interviews with Substance.

Core Qualitative Tools
Head, heart and hands and Snowball fight techniques were used.

Science Delivery

The science activities Project Metaphor has done across the 3 years ranges from Physics, Geography, Astronomy, Biology and practical lessons like CPR and first aid training. These included running experiments demonstrating the process of volcanic eruption, experiments demonstrating gut digestion through bananas and learning CPR with other young people.

The engagement strategy used by the staff has been the same throughout both Warrington Youth Club, and Warrington Youth Zone, informal, focused on building relationships with the young people and encouraging everyone to engage in the topics and discussion.

Results

Outcomes

1) Young people have increased emotional wellbeing

In an interview, Project Metaphor staff gave the example of a young person that kept running away from their project. They said that through their love for science, Project Metaphor were able to use experiments to help justify their emotions they were feeling. On one occasion, the young person said that they are feeling anxious bubbles in their stomach, something that they worked on when using coca cola in the volcanic eruption experiment. A brilliant example of when the ISL activities help young people make sense of their emotions.

2) Young people have increased positive relationships

One staff member highlighted that Project Metaphors "ethos is on relationships. Everything we do is on relationships." They also reiterated that they are outside of mainstream education, and because of this, are able to outline the other options young people have for their educational choices such as University Technical Colleges that offer hands on practical skills around STEM topics.

3) Young people have increased strong self belief

Through the qualitative data provided by Warrington Youth Zone, points from interviews were promoted in the empirical data. One staff member mentioned that the FAIL techniques promoted the young peoples confidence in themselves and not to be afraid of getting things wrong first time. In the qualitative data provided, young people were seen clearly supporting each other throughout the experiments and being comfortable with failure and the need for believing in themselves to try again.

> ***"I wanted to come to science club to learn about the world"***
> *- Young person (video diary)*

> ***"Anyone who comes here can experience new facts in fun ways"***
> *- Young person (video diary)*

> ***"I get to help people and be on camera!"***
> *- Young person (Peer research)*

> ***"My favourite things to learn about are explosions and learning about space!"***
> *- Young person (Peer research)*

> ***"We did a snowball fight evaluation activity for questions and feedback at the end of the volcano session. One young person asked "Does ADHD make you more like a volcano"? This sparked a really interesting discussion around neurodiversity and how different presentations different people have can affect how emotions are handled."***
> *- Staff reflections*

Additional Outcomes

A key additional Outcome that interview data reflected, was new relationships for the organisation through Project Metaphor. In one staff interview reflected on being 'seen' as having a real interest in science through their project has opened new doors to colleges across Warrington. "So it's not just the relationship we've built in house and developed. It's the relationships we've developed outside as well and been able to broaden our horizon and our offer, and funding opportunities especially."

Results

Role of Informal Science Learning (ISL)

How has ISL achieved these outcomes:
Project Metaphor uses science as the vehicle to explore personal and important issues, challenges, or thoughts they may have. The science element develops the young people's confidence and curiosity in learning STEM, while the underlying messages Project Metaphor offers gives a rounded approach to learning, in that young people leave the space with ability in managing emotions, understanding themselves and cultivating resilience in their day to day lives.

What is unique about ISL
For the project lead, what is unique about ISL in this context is that there is informal science learning happening outside the classroom "So being able to offer [Project Metaphor] to young people who tend to be a little quieter, or think about differently, it is really nice to be able to welcome them into the project and work with them and develop their relationships through science.

"I am seeing improved emotional awareness within my 2 groups of young people. Concepts of emotional intelligence are delivered as metaphors within science projects. For example, we have used the metaphor of volcanos to illustrate becoming emotionally overwhelmed. I am also seeing increased teamwork and participation from young people who are involved in project Metaphor. As it is a course that they sign up for in a block I can watch young people grow in confidence as each week of the project passes. "
- ISL staff (interview)

"With our move into this new building, we have been able to give kids the lab experience while presenting an informal, friendly and curious STEM journey"
- Project lead (interview)

Success and Next Steps

Summary of what has been successful for this project
The project has navigated numerous challenges, such as moving to a new building, rebranding, and the operational difficulties that arise from this. However, they have still managed to offer young people a safe space, and track statistically significant individual development across the young people they have worked with.
Next steps
With the conclusion of their Curiosity funding, Warrington Youth Zone have made scrapbooks and videos on all the experiments they have conducted and released them onto a safe space platform, so that young people are able to learn about STEM and themselves, without the need for a physical project to attend.

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