

LSx

London Sustainability Exchange

Cleaner Air 4 Southwark Secondary Schools

FINAL EVALUATION REPORT

2016



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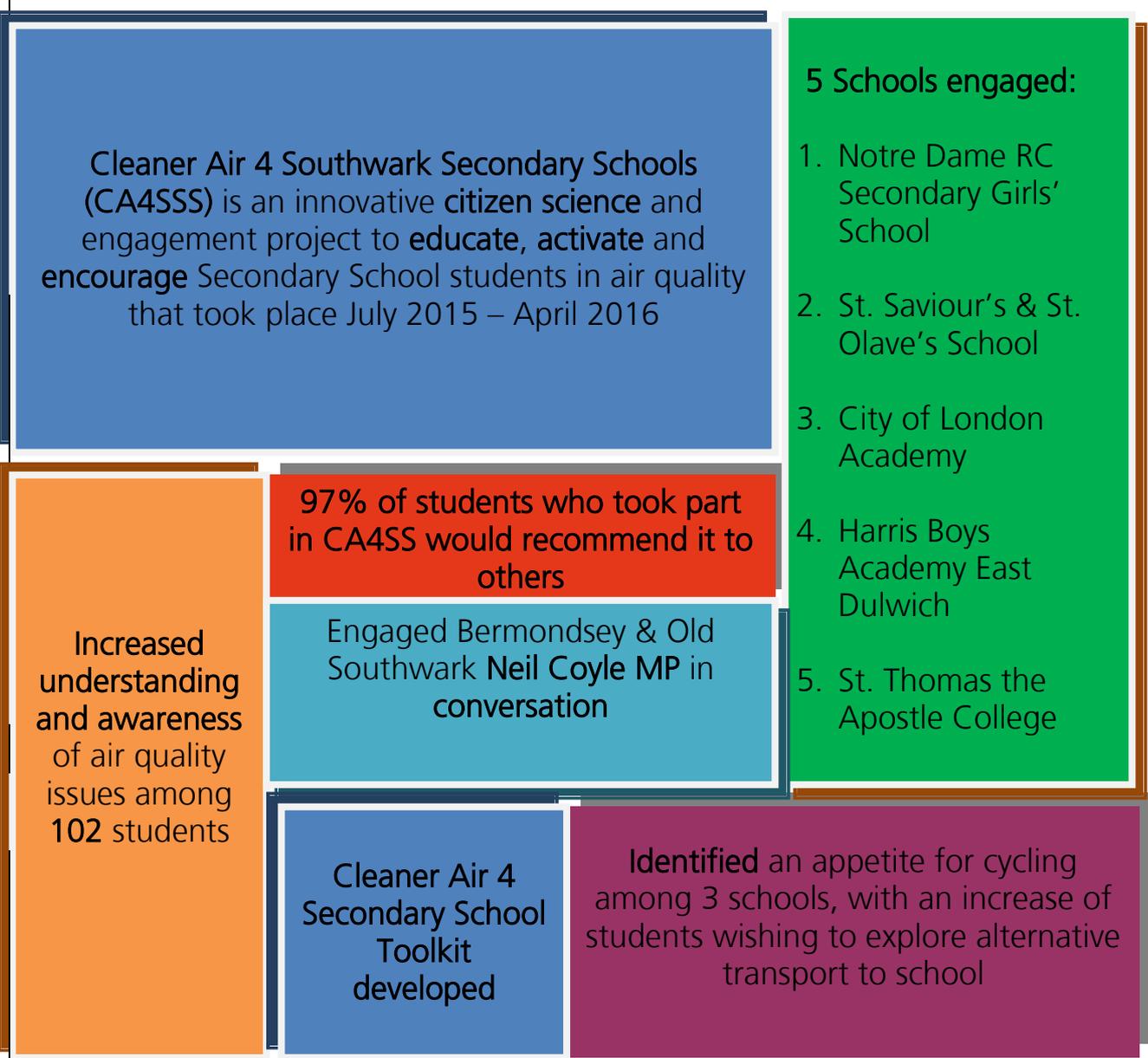


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PROJECT SUMMARY



"It was amazing that the young people asked such enthusiastic and important questions on how air quality can be improved. The girls have worked so hard to understand how that can make the difference, I am keen to stay in touch, and make sure that new planning decisions take the need to improve air quality in the area." - Bermondsey & Old Southwark MP Neil Coyle

"I feel the project was really helpful as now I know how to change the way I travel to stop air pollution" - Year 8 Student

"This project has been excellent – well organised, interesting, and fitted into the curriculum." - Teresa Crowley, Careers Coordinator, Notre Dame

1. EXECUTIVE SUMMARY

LSx was commissioned by the London Borough of Southwark to deliver the Cleaner Air 4 Southwark Secondary Schools (CA4SSS) programme with five secondary schools: Notre Dame RC Girls' School, St. Saviour's & St. Olave's, City of London Academy, Harris Boys Academy East Dulwich and St. Thomas the Apostle College.

Cleaner Air 4 Southwark Secondary Schools is an engaging educational programme that aims to educate young people about the causes and effects of air pollution on health and inspires them to be aware of the changes they can make to reduce both their contribution and exposure to air pollution by adopting more sustainable means of transport such as walking, cycling and taking quieter routes.

In March 2016 a YouGov poll¹ revealed that London parents **see toxic air as 'the biggest health threat to their children'**, while according to a recent study by King's College², an estimated 9,500 Londoners die prematurely each year from causes related to air pollution. Air pollution contributes to a myriad of health problems such as asthma³, heart disease⁴, dementia⁵ and lung cancer & heart failure⁶, with those in deprived communities suffering disproportionately from the poorest air quality⁷. The London Assembly report in 2012⁸ estimated the health costs of air pollution in the UK are £20 billion a year – twice as much as obesity.

Using hands-on citizen science techniques, CA4SSS sought to raise awareness of air pollution among the school community and develop student-led campaigns to explore and encourage behavioural change.

Students from Year 8 and 9 were chosen to take part in the programme given they are in their formative years which provides an opportunity to influence behaviour. Working with this year group does however present some specific challenges which include (but are not limited to):

- Development of their sense of self
- Peer pressure
- Heightened self-consciousness

¹ Evening Standard, March 2016

<http://www.standard.co.uk/news/london/london-parents-see-toxic-air-as-the-biggest-health-threat-to-their-children-a3208221.html>

² Understanding the Health Impacts of Air Pollution in London, July 2015

<http://www.scribd.com/doc/271641490/King-s-College-London-report-on-mortality-burden-of-NO2-and-PM2-5-in-London>

³ Asthma UK

<https://www.asthma.org.uk/advice/triggers/pollution/>

⁴ British Heart Foundation

<https://www.bhf.org.uk/about-us/our-policies/preventing-heart-disease/air-pollution>

⁵ The Fisher Center For Alzheimer's Research Foundation

<https://www.alzinfo.org/articles/air-pollution-raise-dementia-risk/>

⁶ NHS, July 2013

<http://www.nhs.uk/news/2013/07July/Pages/air-pollution-linked-to-lung-cancer-and-heart-failure.aspx>

⁷ Air Quality and Social Deprivation in the UK: an environmental inequalities analysis, DEFRA, 2006

http://uk-air.defra.gov.uk/assets/documents/reports/cat09/0701110944_AQinequalitiesFNL_AEAT_0506.pdf

⁸ Air pollution in London - issues paper, December 2012

<https://www.london.gov.uk/about-us/about-us/london-assembly/london-assembly-publications/air-pollution-london-issues-paper>

Cleaner Air 4 Southwark Secondary Schools saw:

- **102 pupils** engaged in five schools with project activities including citizen science and planning campaigns.
- Creation of visual media by students including animations, leaflets and posters (see Appendix 6.6 for examples from Notre Dame.)
- Students presented results at an air quality conference in city hall with over 100 delegates including several London Assembly members, local authority officers, councillors and community groups (see Appendix 6.7 for further details.)
- Redevelopment of the Cleaner Air 4 Secondary Schools Toolkit by educational specialists *do it kits* with lesson plans, resources and activities for 2016 Key Stage 3 Geography, Science and Citizenship, a suggested pathway for Key Stage 5 and a travel planning document. LSx are keen to develop the resource as a stand-alone accredited course suitable for KS5 and higher learning objectives.

Project & Travel Conclusions

- The Cleaner Air 4 Secondary Schools citizen science approach is an effective method for educating young people about air quality and environmental issues, with 88% reporting an increase in knowledge on the subject, 85% developing an understanding of how their actions impact on others, and **97% of students recommending CA4SS to others**.
- The Cleaner Air 4 Secondary Schools toolkit was successfully translated and transferred across different school settings, from a small residential parish town in Hertfordshire to an inner city environment, and is applicable to both.
- **There is a strong preference for more active travel, especially cycling and walking**, among students in the majority of schools, but not all. This is likely due to the prevailing 'culture of the school', available infrastructure and exposure to cycling as a safe, sustainable transport method.
- The majority of students travel to school by public transport. This, and other, travel modes do not appear to correlate with distance to / from school or associated to geography or school achievement. It was commonly found that some students who walk travel longer distance than some of those who travel by bus.

Recommendations

For school travel

- Cycling infrastructure and training will provide effective **enabling** tools for schools that are receptive to cycling. With cycle infrastructure improvements throughout Southwark, getting young people involved in cycling at this important time could set them up for life. Teachers and students who cycle could serve as **exemplar** cycle champions.
- Schools should strongly **encourage** students who live within 0.5-1 mile to walk to school, as the majority of these students are currently taking the bus against their preferred (desired) travel mode. Individual and class incentives and gamification could help realise this.

For future roll-out

- It is important to capitalise on student’s enthusiasm and **engage** others in this work. In order to keep up momentum, it is recommended that students share their work and results with other students in the school through assemblies, if not already. In efforts to reach the wide community, this could include presentations at local primary schools.
- To increase knowledge on the subject, it is recommended that the Geography, Science and Citizenship **Toolkits** are deployed to relevant subject teachers in the schools to **enable** students to gain a deeper understand and different perspective on air quality issues and their solutions.

For new schools

- The Cleaner Air 4 Secondary Toolkits should be made available to teachers throughout Southwark to work not only alongside Science, Geography and Citizenship KS3 curriculums, but also KS5 as a non-curriculum resource. A *user-guide for Cleaner Air 4 Secondary Schools Toolkit* is set out in Box 1 below.
- LSx are keen to develop the resource as a stand-alone accredited course suitable for KS5 and higher learning objectives.
- It is important to establish more about the factors that determine the prevailing school culture in order to capitalise on this.

Box 1. User-guide for Cleaner Air 4 Secondary Schools Toolkit

To maximise impact & benefit of the project through:

- **Teacher Champions**– Crucial to the success of the project, is teacher involvement, championing, chasing and chivvyng along students in between sessions
- **Enabling Actions** – Build these into the project structure from the beginning, trail sustainable travel, work with School Governors and external stakeholders
- **Cross-curriculum learning** – Make sure of all three subject areas with their unique perspective
- **Making use of your School Travel Plan if you have one, create one if you don’t** – This project can be useful method to collect information and data for a School Travel Plan
- **Enabling peer-to-peer learning** - Share messages within and between schools, if permitted social media can be a great platform for this

2. INTRODUCTION

This section provides an overview of the project:

- Aims of the project
- Project context including background and policy drivers
- Project design – citizen science and social marketing
- Rationale – the theory and learning behind the project.

2.1 Aims of the Project

LSx was commissioned by the London Borough of Southwark to deliver the Cleaner Air 4 Secondary Schools Southwark (CA4SSS), working with five secondary schools. Using hands-on **citizen science** techniques, the programme sought to:

- **Increase awareness and understanding** of air pollution issues among the school community and develop a rationale that students can take with them to inform their travel behaviours as they develop their independence
- **Enable** students to protect their health and reduce their impact
- **Encourage** students to communicate the message to the wider school community (older and younger students as well as teachers and parents) through student-led campaigns

2.2 Context

Along with many other European cities, London is failing to meet EU air quality limit values for air pollution. There are two pollutants that cause the most concern within London:

- Nitrogen dioxide (NO₂)
- Particulate matter (PM_{2.5} and PM₁₀)

Levels of NO₂ and PM have decreased significantly since the 1950s when environmental protection legislation was first introduced in the UK. However, since about 2002 inner London boroughs have struggled to reduce pollution levels significantly⁹. Under European Union air quality laws, PM_{2.5} concentrations must not exceed an annual average of 25µg/m³, whilst PM₁₀ concentrations must not exceed 50µg/m³ on more than 35 days in a year¹⁰. Most significantly to this project, NO₂ levels must not exceed an annual average of 40µg/m³.

⁹ London Air Quality Network report 14, 2009

http://www.londonair.org.uk/london/asp/reportdetail.asp?ReportID=lar2006&ReportType=Latest_Report

Air Quality in London – briefing note to GLA Environment and Health Committee, July 2012

<http://www.londonair.org.uk/london/reports/Air%20Quality%20in%20London%20GLA%20Health%20and%20Env%20briefing%20note%20July%202012.pdf>

¹⁰ European Commission Air Quality Standards

<http://ec.europa.eu/environment/air/quality/standards.htm>

The London Mayor has a legal responsibility to regularly prepare and review an Air Quality Strategy¹¹ for the Greater London area with a focus on bringing London's air quality up to EU targets and reducing Londoners' exposure to pollution.

When pollutants are found to exceed the EU limits, an Air Quality Management Area (AQMA) must be declared and an Air Quality Action Plan (AQAP) must be developed by the Borough.

Under the EU Air Quality Directive, which came into force in 2008 and set limit levels for NO₂¹², London as a region has failed to meet the targets. In April 2015 the UK Supreme Court ordered the UK Government to take immediate action on air pollution following a five year law suit by ClientEarth; which meant the Government had to produce a comprehensive plan to meet pollution limits as soon as possible. However, the resulting plans were so poor that ClientEarth took the government back to the High Court in a Judicial Review and in November 2016, the High Court ruled that the government's 2015 Air Quality Plan failed to comply with the Supreme Court ruling or relevant EU Directives. Action now needs to be taken; some of the measures that must be considered are low emission zones, congestion charging and other economic incentives. The London Assembly report¹³ in 2012 estimated the health costs of air pollution in the UK are £20 billion a year – twice as much as obesity.

There were an estimated 9,416 deaths in London attributable to Particulate Matter and NO₂ in 2015; and there were 206 attributed to NO₂ in the borough of Southwark alone¹⁴. Air pollution contributes to a myriad of health problems including asthma, heart disease and lung disease. Children are particularly at risk because of their smaller lung capacity. Most air pollution emitted in London is from road transport, and domestic and commercial heating systems, which creates a case for community and public awareness and engagement in air quality and behaviour change.

2.3 Project Design

Building on the success of our Cleaner Air 4 (Primary) Schools (CA4S) model developed by LSx in 2011-12, a pilot Cleaner Air 4 Secondary Schools model and Toolkit was developed with East Hertfordshire 2013-14. London Borough of Southwark commissioned LSx to deliver sessions at five schools (see Appendix 6.1 for school profiles) and redevelop the toolkit for roll-out across Southwark and beyond.

Cleaner Air 4 Schools uses citizen science methods to engage students in air quality. Working with secondary schools allows a more in-depth exploration of the topic as well as giving students more autonomy over results and how they are used. Students were encouraged to work in teams to investigate air quality in the first instance, and create a student-led campaign based on the results. An overview of lessons is given in section 2.3.2. Lesson plans were revised

¹¹ The Mayor's Air Quality Strategy, December 2010
<http://www.london.gov.uk/sites/default/files/Air%20Quality%20Strategy%20v3.pdf>

¹² European Commission Air Quality - Existing Legislation
http://ec.europa.eu/environment/air/quality/legislation/existing_leg.htm

¹³ Air pollution in London - issues paper, December 2012
<https://www.london.gov.uk/about-us/about-us/london-assembly/london-assembly-publications/air-pollution-london-issues-paper>

¹⁴ Understanding the health impacts of pollution in London, July 2015
https://www.london.gov.uk/sites/default/files/HIAinLondon_KingsReport_14072015_final_0.pdf

and a number of resources were developed, these can be found in the appendix (see appendices 6.4 and 6.5). Focus groups were also held with a number of schools to ascertain the barriers to undertaking more sustainable forms of travel as well as the more successful option for engagement.

2.3.1 Challenges of working with this age group

Students constitute a large, unique and wide-reaching network within a culturally diverse London, linking households, cultures and religions; their potential to be effective 'change agents', as identified through the principles of social network theory, is highlighted by their natural personality types and far-reaching ties to various groups in society. Research suggests that developing the capacity of London's young people to act as agents of change in their communities could be a worthy investment and potentially key to making London a more sustainable world city. They have the power to influence their parents and wider community.¹⁵ Working with this age group in this programme therefore provides a great opportunity. In this instance we therefore didn't target the parents. Previous LSx projects 'Children as Change Agents' as well as other studies have however identified a number of specific challenges, and a presented below.

Development of 'sense of self' and identity

Developmental changes during adolescence are often associated with changes in cognition, social, emotional and moral development.¹⁶ Adolescence is critical in the development of self as it is the transitional zone between childhood and adulthood. Firstly, the childhood values no longer work for teenagers and the values of adults do not quite fit their reality.¹⁷

It is during the teenage years that the adolescent needs to revisit childhood values and ideas and determine if those ideas will continue to serve them as they move into adulthood. Secondly, the sense of self that is formed at this stage will linger into adulthood. This period of time is where the teenager emerges as a new person and it is when they decide who they want to be and what they want to do with their lives.

Peer pressure and heightened self-consciousness

Teenagers are often influenced by their peers in comparison to children and young adults. In adolescence the way individuals see themselves changes in response to peers, family, and school, among other social environments. Our self-identities shape our perceptions of belonging and a positive self-identity correlates with a positive self-esteem.¹⁸

Characteristically teenagers have a heightened self-consciousness with changes to their self-esteem and wariness of how others perceive their actions. All identities are not equally valued by society some adolescents may especially need reinforcement to help them construct a

¹⁵ Behaviour Change Interventions: teenagers, technology and design
http://www.academia.edu/4394434/Behaviour_change_interventions_teenagers_technology_and_design

¹⁶ Ibid

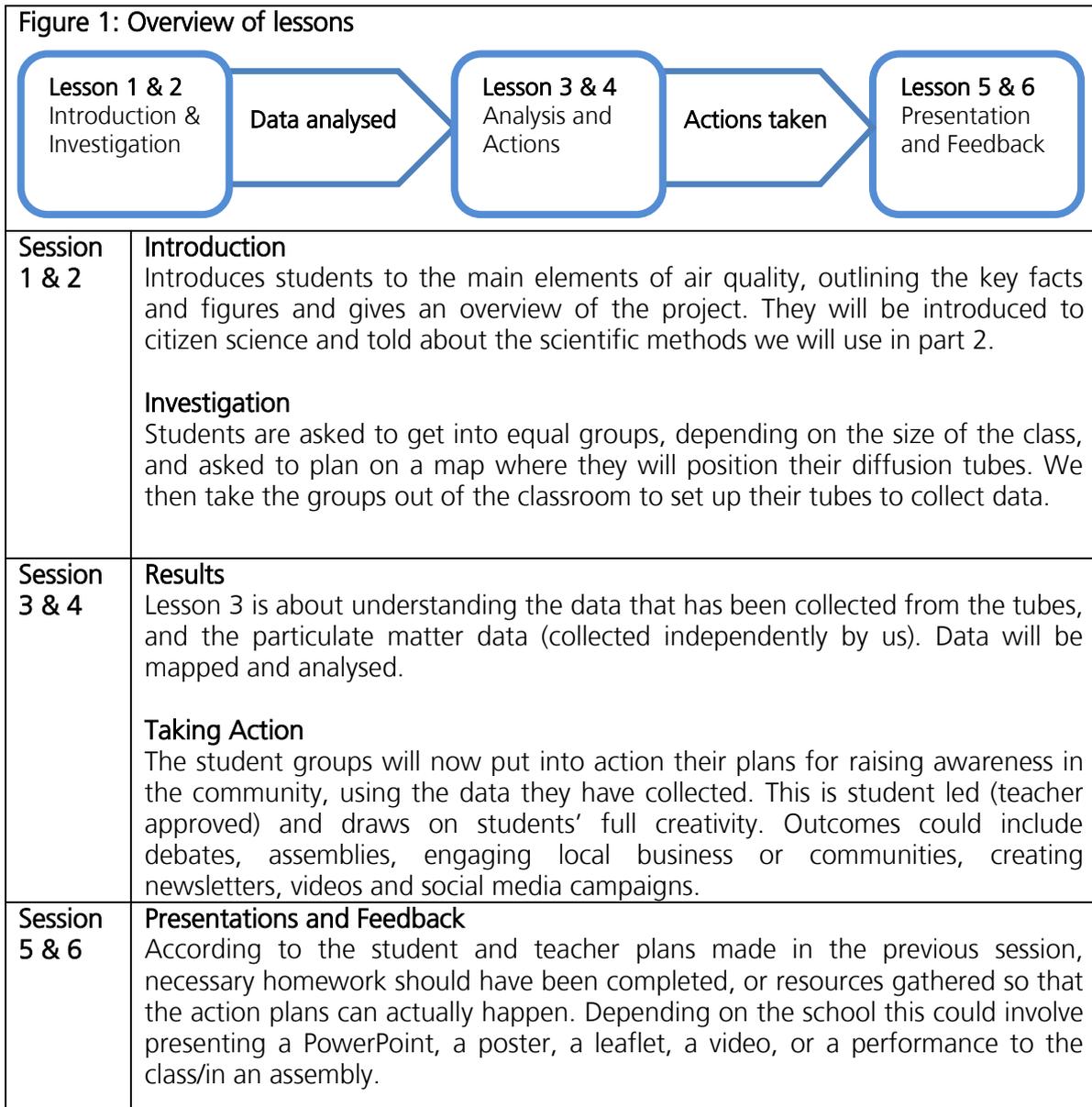
¹⁷ Educational Psychology Course,
<http://study.com/academy/lesson/changes-in-sense-of-self-from-childhood-to-adolescence.html>

¹⁸ Adolescent Identity Development, Act for Youth
<http://www.actforyouth.net/adolescence/identity/>

positive sense of self.¹⁹ Therefore how peers act and work amongst peers is crucial to having a response to a behaviour change activity, for example in utilising a different travel option.

2.3.2 Theory of Change

CA4SS has been designed around the National Curriculum 2014 (subsequently redeveloped 2016). The programme engaged 5 schools in three double lessons (a total of 30 hours) over a number of weeks, as shown in Figure 1. See Appendix 6.2 for Schools’ Schedule and Appendix 6.4 for Lesson Plans used.



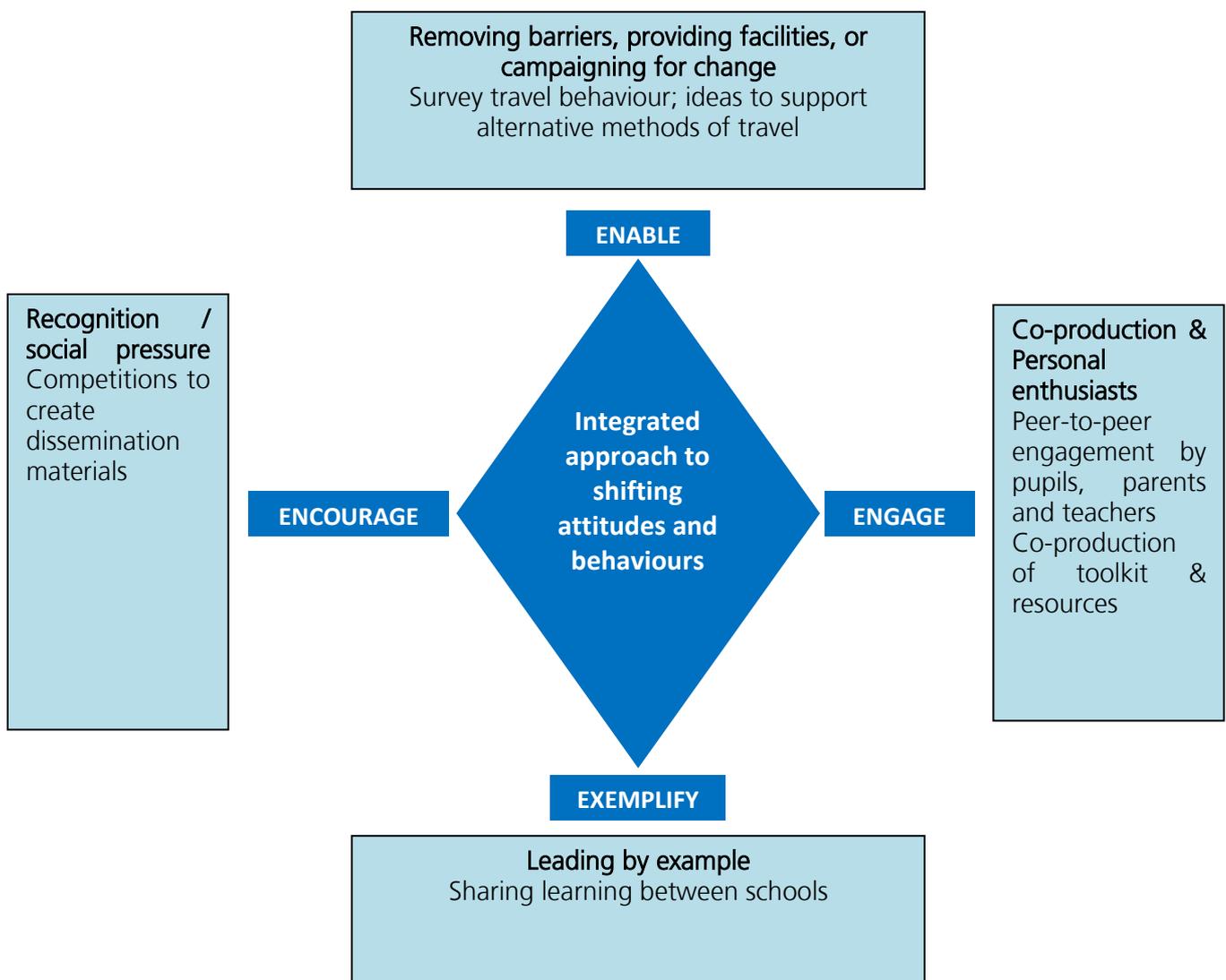
¹⁹ Ibid

In order to bring about change, this programme is built around DEFRA’s 4E’s Behaviour Change Framework, see Figure 2 below.

Figure 2: DEFRA’s 4E’s model of behaviour change as applied to Cleaner Air 4 Southwark Secondary Schools

DEFRA’s 4E’s Behaviour Change Framework uses four main mechanisms for intervention,

- **ENABLING:** Make it easier to act - remove barriers/ ensure ability to act; Build understanding; Provide facilities/viable alternatives; Educate/train/provide skills; Provide capacity
- **ENGAGING:** Get people involved - work with trusted intermediaries; Use networks; Co-produce; Use insight to mobilise population groups (segment)
- **EXEMPLIFYING:** Demonstrate shared responsibility - lead by example; Demonstrate others are acting
- **ENCOURAGE:** Provide incentives and disincentives: Give the right signals to encourage, and ensure your target audience responds; Provide feedback.



Engagement and school selection

The Cleaner Air 4 Schools project was delivered over a period of eight months from September 2015 to April 2016, overlapping with the first and second school terms. An overview of the project schedule is shown below.

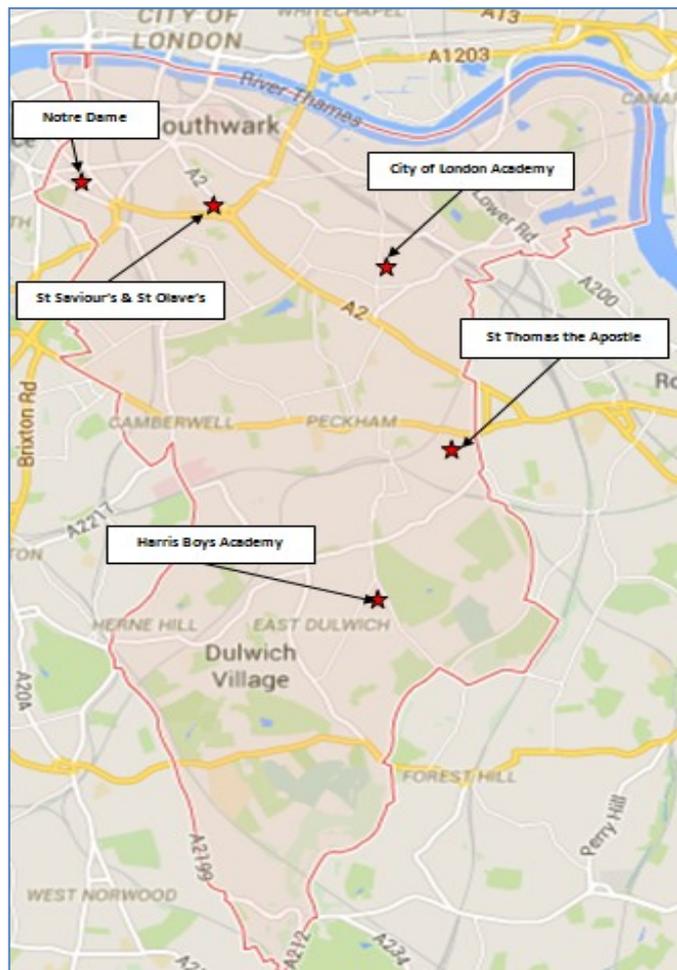
Cleaner Air 4 Schools Timeline



Five schools across Southwark were selected to take part in the project. Schools were sent introductory emails to the project and this was followed up with a phone call and then a visit to explain the project, its aims and the plans the school would have to make.

The five schools engaged were

- Notre Dame RC Girl’s School, St George’s Road, London SE1 6EX
- St. Saviour’s and St. Olave’s Church of England School, New Kent Rd, London SE1 4AN
- The City of London Academy Southwark, Lynton Rd, Southwark, London SE1 5LA
- Harris Boys’ Academy East Dulwich, Peckham Rye, London SE22 0AT
- St Thomas the Apostle College, Hollydale Road, Nunhead, London SE15 2EB



3. FOCUS GROUP RESULTS

Students at three schools were asked a series of questions around how they travel to school, how they would like to travel to school as well as how they receive information. The responses are shown in Table 1. Please note, due to time restrictions of the programme, only three of the five schools were able to participate in the focus groups.

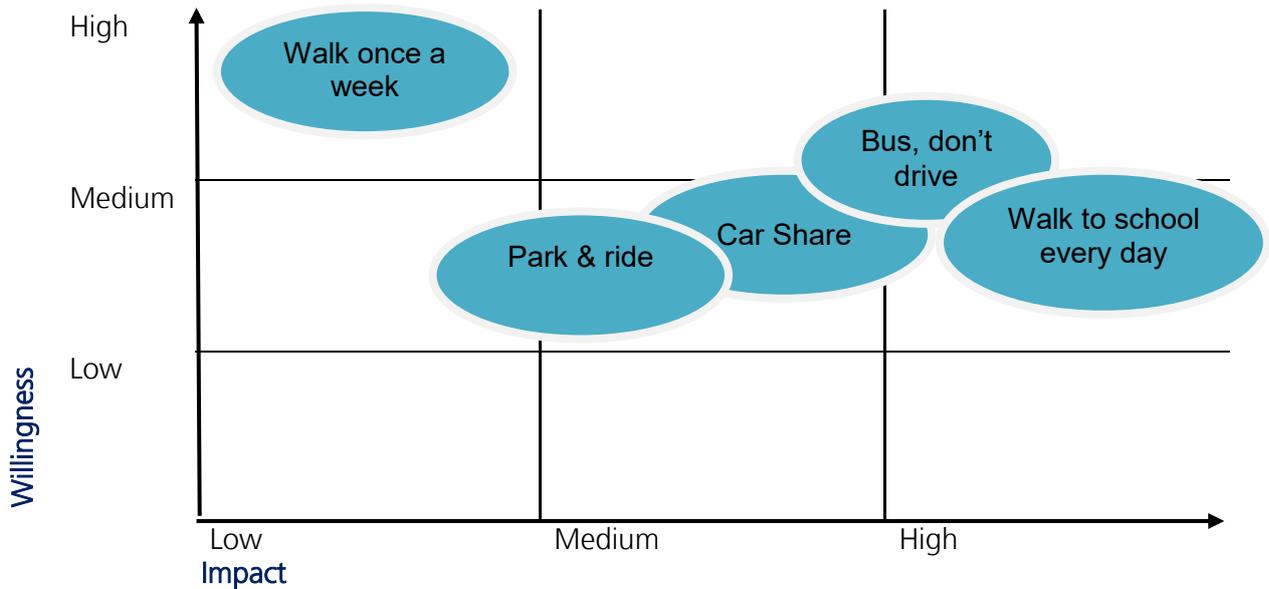
Table 1: Student Responses to travel actions

	School 1	School 2	School 3
Current travel how and why	Quicker to walk		Drive – it’s quick, more convenient. Dad drops me off.
	Live too far so can’t walk or cycle		Warmer in a car and you don’t get wet
	Walk as there is no bus		Bus – depending on the weather Walk to school but after I get the bus with my friends
Travel preference	By roller skates – fun, easy and no pollution	Car – own space to listen to music	Car – more freedom
	Cycle – healthy, it’s fun	Bike	My friends have cars, I’d like to get my driving licence
	Walking – quicker than bus as can control timing	Skateboard	Everything is fossil fuel, it’s not just cars
	Bus (it is the easiest)		
Barriers to travel preference	Self-conscious of walking past other schools where there are groups of children	Takes too long to walk	Need licence (too young)
	Journey times	Weather	Weather
	Self-conscious when cycling ‘sweaty’	Too expensive by train	Timing
	Bus gets stuck in traffic, has bad timing and is full		
How do you like to get news?	Radio	Snapchat photos –	Twitter, everything is on Twitter
	Twitter and Facebook are not used anymore – snapchat and Instagram are more used	No one uses Facebook anymore	The school, they tell us of big things
	TV		
News content interests	Celebrities		Celebrities – Emma Watson and Leonardo DiCaprio were talking about environmental issues.
	Celebrating positive things		Don’t hear about anything unless big event
	Random acts of kindness		
How do you get information from your school?	Assembly		
	Email preferred		
	Don’t use website much		

3.1 Selecting behaviours – potential willingness and impact

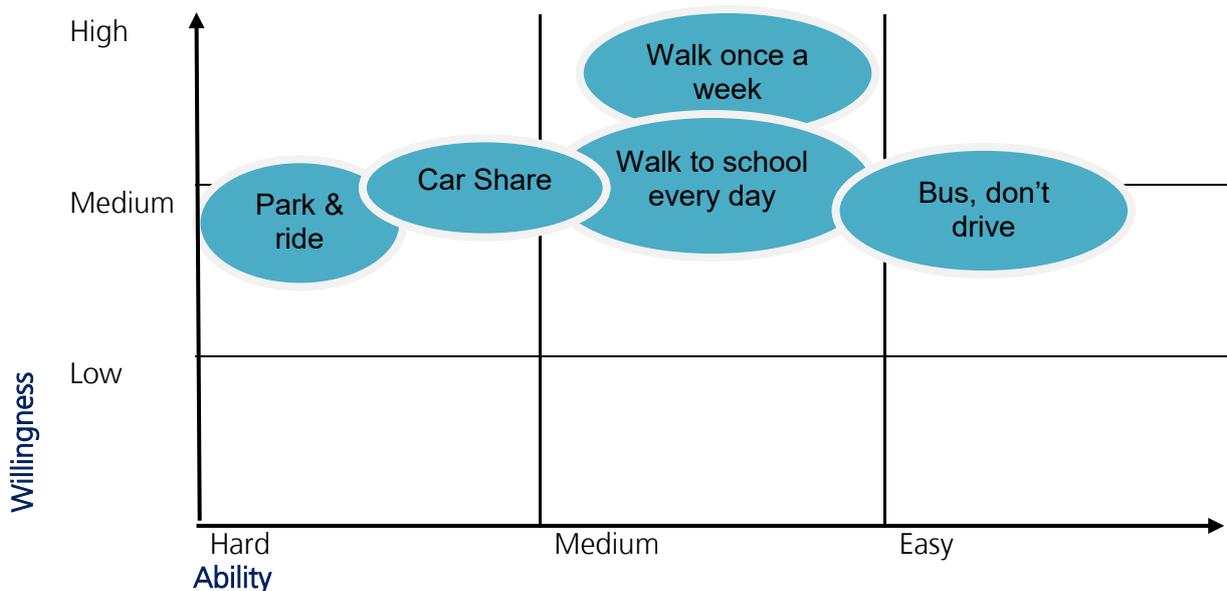
An analysis of behaviours identified during the focus group and the project has been undertaken which shows the potential ‘willingness’ and ‘impact’ of travel behaviours. This generalised interpretation, illustrated in figure 3, shows impact as ‘low’, ‘medium’ and ‘high’.

Figure 3: Potential willingness and impacts of behaviours



As can be seen behaviours with high ‘willingness’ to engage a ‘medium’ impact with ‘walk to school’ as the most prominent example. When examined further in relation to ‘willingness’ and ‘ability’ to adopt them, indicatively, the following behaviours are identified (see figure 4).

Figure 4: Potential willingness and ability to adopt behaviours



4. CONCLUSIONS & RECOMMENDATIONS

4.1 Project & Travel Conclusions

- The Cleaner Air 4 Secondary Schools citizen science approach is an effective method for educating young people about air quality and environmental issues, with 88% reporting an increase in knowledge on the subject, 85% developing an understanding of how their actions impact on others, and **97% of students recommending CA4SS to others**.
- The Cleaner Air 4 Secondary Schools Toolkit was successfully translated and transferred across different school settings, from a small residential parish town in Hertfordshire to an inner city environment, and is applicable to both.
- **There is a strong preference for more active travel, especially cycling and walking**, among students in the majority of schools, but not all. This is likely due to the prevailing 'culture of the school', available infrastructure and exposure to cycling as a safe, sustainable transport method.
- The majority of students travel to school by public transport. This, and other, travel modes do not appear to correlate with distance to / from school or associated to geography or school achievement. It was commonly found that some students who walk travel longer distance than some of those who travel by bus.

4.2 A Comparison of the urban inner-city schools of the London Borough of Southwark with the small residential Levanthorpe School in East Hertfordshire

While working with five secondary in Southwark, LSx also worked with a single class in one secondary school in East Hertfordshire as part of a separate contract. While a direct comparison cannot be made, some tentative conclusions can be drawn:

- **Travelling to school** - 71% of students used some form of public transport to get to school in LB Southwark. There was no clear travel-mode majority in Levanthorpe, with approximately one-third of students walking, one-third taking some form of public transport and one-third travelling by car.
- **Pollution levels and perception** – London students are exposed to a much higher level of pollution, with, on average 77% (49 out of 63) NO₂ diffusion tubes indicating an 'exceedance' compared to just 4 out of 17 in East Herts. Awareness of air pollution was slightly higher in LB Southwark (57%) compared to that of Levanthorpe (38%), however there was little difference in concern (65% versus 61%).
- **Social Norms are important** - In both the urban and the rural schools, there is a preference for being with one's friends when travelling to school. So strong is this preference that some student's even admitted that this is inconvenient for them. Hertfordshire has one of the highest car-ownership levels in the UK at 83%²⁰, compared

²⁰ Hertfordshire Transport Facts 2012
<http://www.hertfordshire.gov.uk/docs/pdf/t/TRFS2012.pdf>

to London's 54%²¹; however this is as low as 40% in London Borough of Southwark²². While only collected qualitatively through class discussions, there does not appear to be a difference in aspirations to drive and own a car among this age group.

- **Barriers to cycling** – Students in all schools presented numerous barriers to cycling, this included cycling infrastructure and fear of cycling (dangerous); however as above, social norms and self-identity seemed to play an important role.
- **'Twitter and Facebook are dead'** – Twitter and Facebook are seen as 'out of date' for this year group in all schools, and instead visual-media such as YouTube, Snap-chat and Instagram are favoured.

The differences observed are likely to be reflective of a number of factors, including geography, availability of public transport and affluence.

4.3 Recommendations

For school travel

- Cycling infrastructure and training will provide effective **enabling** tools for schools that are receptive to cycling. With cycle infrastructure improvements throughout Southwark, getting young people involved in cycling at this important time could set them up for life. Teachers and students who cycle could serve as **exemplar** cycle champions.
- Schools should strongly **encourage** students who live within 0.5-1 mile to walk to school, as the majority of these students are currently taking the bus against their preferred (desired) travel mode. Individual and class incentives and gamification could help realise this.

For future roll-out

- It is important to capitalise on student's enthusiasm and **engage** others in this work. In order to keep up momentum, it is recommended that students share their work and results with other students in the school through assemblies, if not already. In efforts to reach the wide community, this could include presentations at local primary schools.
- To increase knowledge on the subject, it is recommended that the Toolkits are deployed to relevant subject teachers in the schools to **enable** students to gain a deeper understand and different perspective on air quality issues and their solutions.

For new schools

- The Cleaner Air 4 Secondary Toolkits should be made available to teachers throughout Southwark to work not only alongside Science, Geography and Citizenship KS3 curriculums, but also KS5 as a non-curriculum resource. A *user-guide for Cleaner Air 4 Secondary Schools Toolkit* is set out in Box 1 below.
- LSx are keen to develop the resource as a stand-alone accredited course suitable for KS5 and higher learning objectives.

²¹ Roads Task Force – Technical Note 12, Transport for London
<http://content.tfl.gov.uk/technical-note-12-how-many-cars-are-there-in-london.pdf>

²² Ibid

- It is important to establish more about the factors that determine the prevailing school culture in order to capitalise on this.

Box 1. User-guide for Cleaner Air 4 Secondary Schools Toolkit

- **Teacher Champions**– Crucial to the success of the project, is teacher involvement, championing, chasing and chivvying along students in between sessions
- **Enabling Actions** – Build these into the project structure from the beginning, trail sustainable travel, work with School Governors and external stakeholders
- **Adapt** – CA4SS is entirely flexible and can be adapted to suit the school's needs, timeframe and budget
- **Timescales** – Sessions are designed to fit over a school term (6-8), set clear and defined timescales avoiding exams and other commitments.
- **Curriculum** – The project is designed around the curriculum, fit it alongside science, geography or citizenship lessons
- **Travel Plan**- Most schools have a travel plan, make use of yours, or if you don't have one, ask students for their input

5. CASE STUDIES

5.1 Case Study: Notre Dame RC Secondary Girls' School

118 St George's Road, London SE1 6EX

Notre Dame High School is an all-girls' Roman Catholic comprehensive school situated in Elephant and Castle.



Overview

- Year 8 Science Class of 26 students
- Three staff including 1 Teacher, 1 TA, 1 Career's Advisor
- Six student groups measured Nitrogen Dioxide using (NO₂) Diffusion Tubes over a two-week exposure period.
- Student groups developed campaigns seeking to engage parents, teachers, peers and local primary schools around air quality issues.
- Students worked in teams of 5-6
- Each team defied a target audience

Key findings and results

- Following the two week exposure, 15 out of the 16 diffusion tubes recorded NO₂ that if averaged over the year would exceed annual the EU legal limit of 40µg/m³.
- All students surveyed reported travelling to school by public transport



Key achievements

- The number of students wishing to travel to school by walking or cycling increased by 100% (4 to 8)
- 14 students reported knowing a lot about air pollution compared to 24 in the follow-up, an increment of 71 %
- 17 of the student from the baseline survey recorded they are aware of their action to reduce air pollution compared to in the follow-up survey, which recorded 24 students, representing a 41% increase
- 100% (23) students would recommend the programme to others

Achievements

- Teams produced leaflets, posters and presentations, examples include:
 - Production of air quality leaflets in English and Spanish (see Appendix 6.5)
 - Creation of a song about air pollution which they performed to their class and peers
 - Presentations to two Primary Schools
 - Presented results at an air quality conference in City Hall to over 100 delegates including several London Assembly members, local authority officers, councillors and community groups. See Appendix 6.7 for further details.
- The class invited Neil Coyle MP to come and discuss air quality with them.

- The MP meeting and results of the study were published in London SE1 Community Website²³
- Subsequent to the programme, the class were planning on a visit to the British Transport Museum

See Appendix 6.3 for recommendations for future action



"I feel the project was really helpful as now I know how to change the way I travel to stop air pollution."

- Josephine, Year 8 Student, Notre Dame

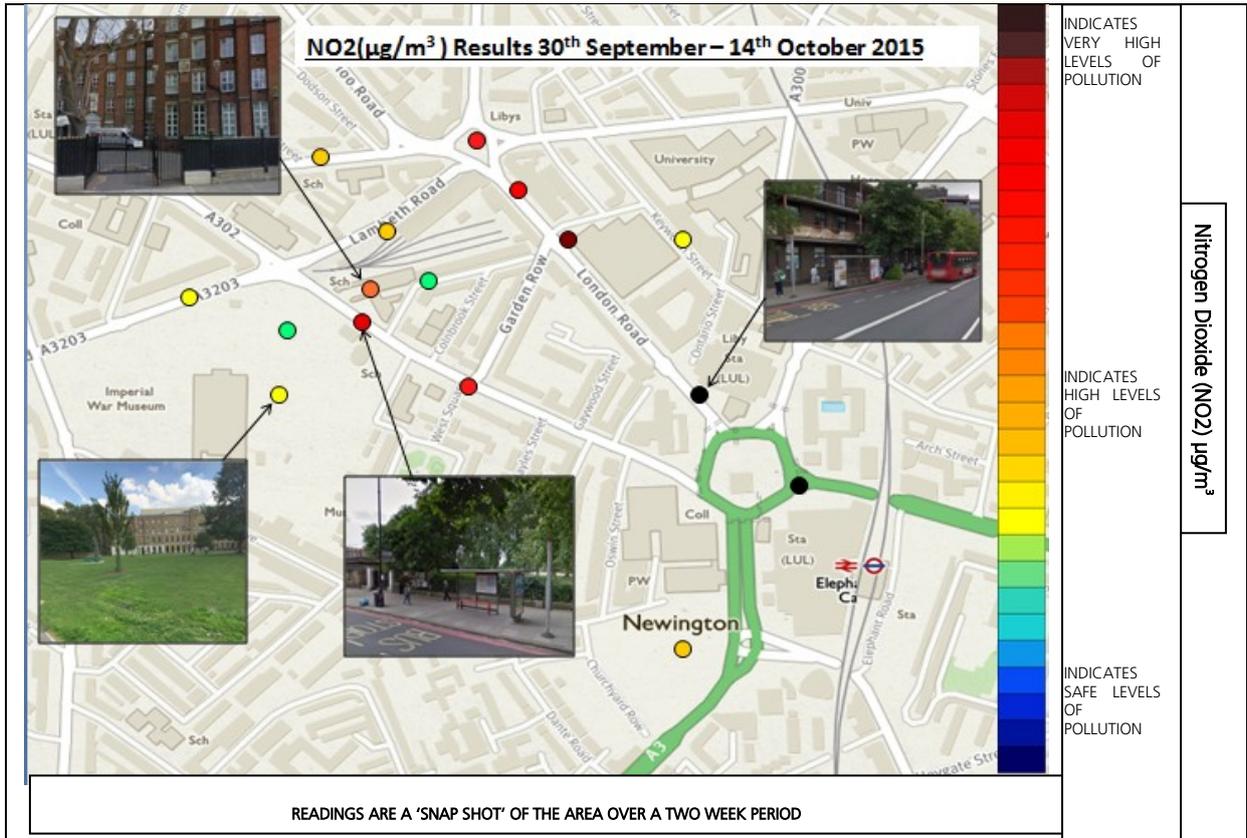


"It was amazing that the young people asked such enthusiastic and important questions on how air quality can be improved. The girls have worked so hard to understand how that can make the difference, I am keen to stay in touch, and make sure that new planning decisions take the need to improve air quality in the area."

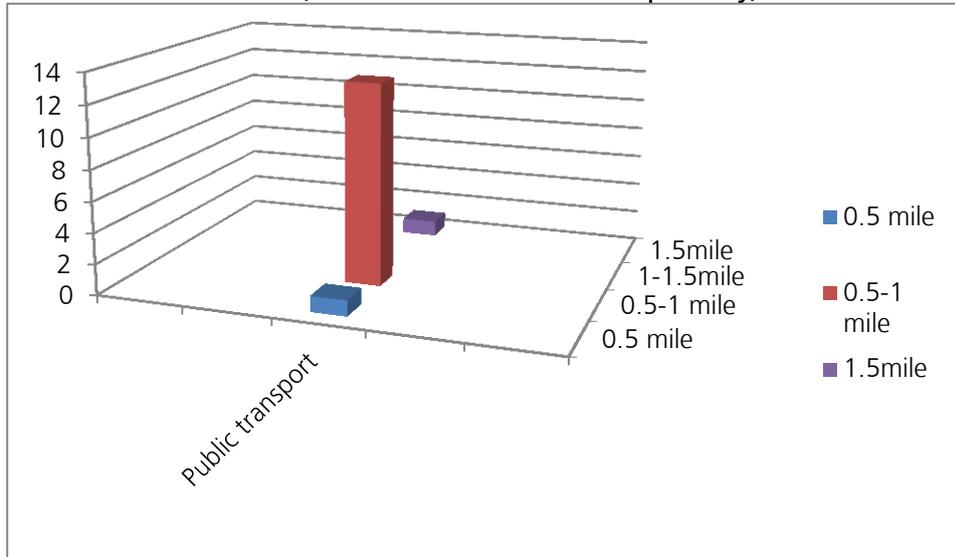
- Bermondsey & Old Southwark MP Neil Coyle

"This project has been excellent – well organised, interesting, and fitted into the curriculum". - Teresa Crowley, Careers Coordinator, Notre Dame

²³ <http://www.london-se1.co.uk/news/view/8610>



Current travel methods (as recorded in the follow-up survey)



5.2 Case Study: St. Saviour's & St. Olave's School

New Kent Rd, London SE1 4AN

St. Saviour's & St Olave's School is an all-girls' Church of England school situated in Elephant and Castle.



Overview

- Year 9 Geography Class of 25 students.
- Two staff including 1 Teacher and 1 TA
- Five student groups of five each spread out across the area to put out NO₂ diffusion tubes.
- The data collected would later be used to form the basis of their miniature pollution campaigns.

Key findings and results

- Following the two week exposure, 12 out of the 16 diffusion tubes recorded NO₂ that if averaged over the year would exceed annual the EU legal limit of 40µg/m³. Two of these tubes recorded readings over twice the legal limit.
- The vast majority of students travel to school by public transport, even those who live less than a mile from the school. Some students who did walk to school lived furthest away.

Key achievements

- In the baseline, the number of student who know a lot about air pollution was recorded as 14 compared to the follow-up of 21 student .This indication show a percentage increase of 41%
- 18 student indicated they would recommend the programme

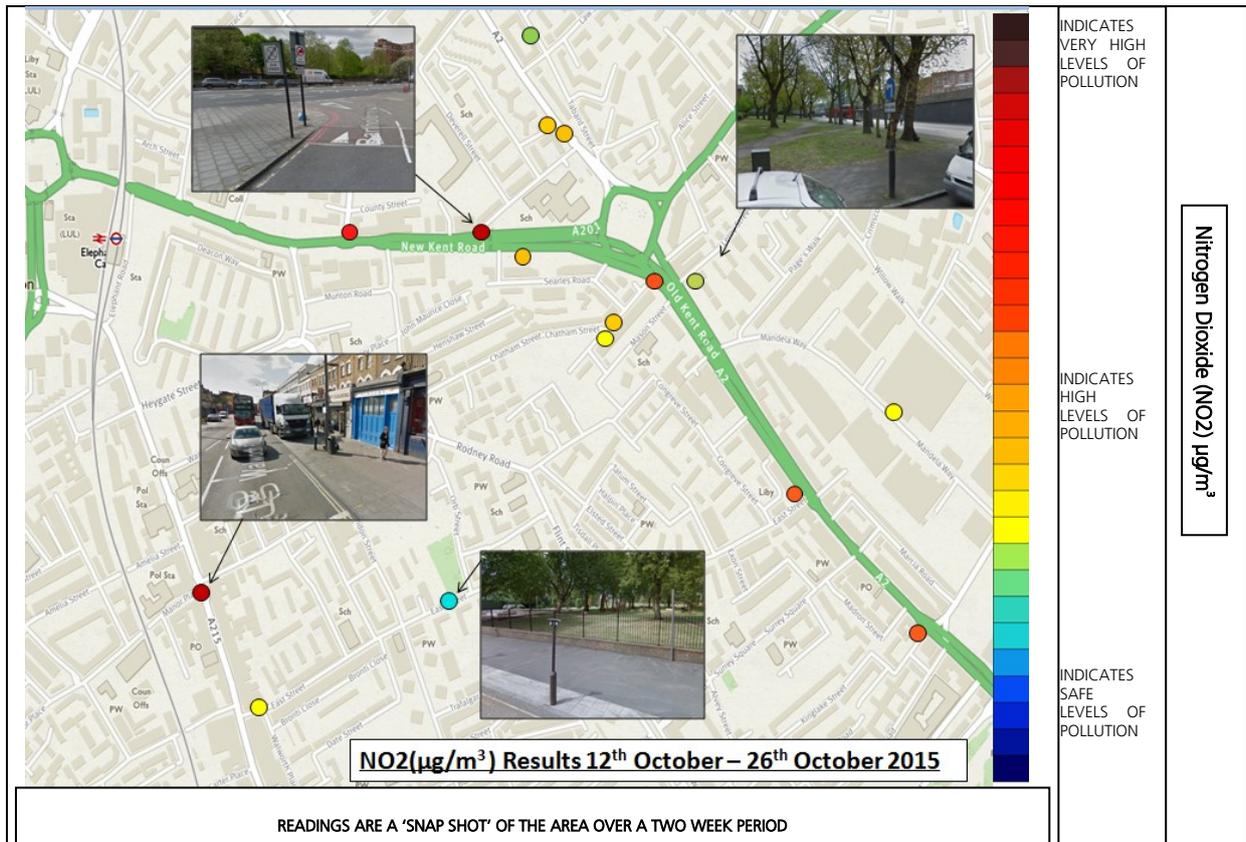
Achievements

Teams produced presentations which included:

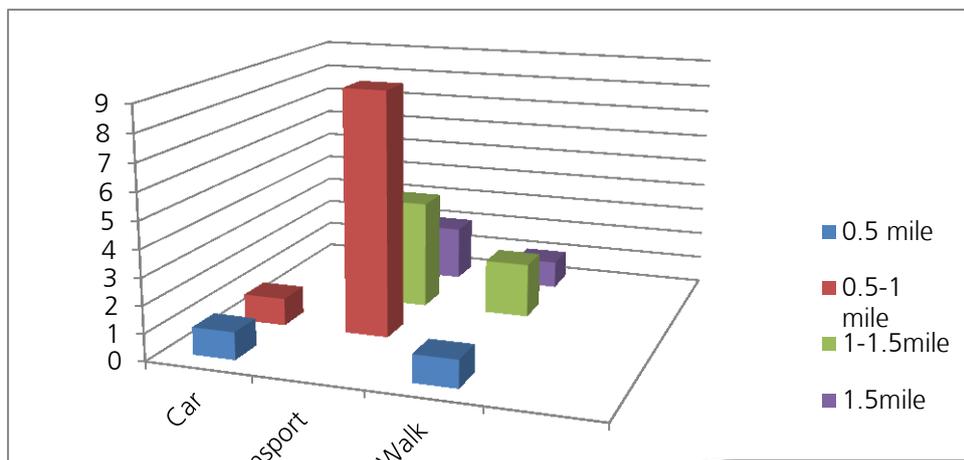
- Creation of a song about air pollution which they performed to their class and peers
- Production of a short air quality animation²⁴

See Appendix 6.3 for recommendations for future action

²⁴ LSx were unable to obtain a copy of the animation to include in this report



Current travel methods (as recorded in the follow-up survey)



"I enjoyed the project because it was a different way to enjoy geography." – Modupe James, Student, St. Saviour's and St. Olave's

"Today was brilliant, the girls were really involved and I think the presentation, the resources, and the way the session was run was fantastic." – Sarah Brain, Geography Teacher, St. Saviour's and St. Olave's

5.3 Case Study: City of London Academy Southwark



Lynton Rd, Southwark, London SE1 5LA

City of London Academy Southwark is a mixed school situated in Bermondsey.

Overview

- Year 9 Science (Chemistry/Biology) Class of 16 students
- 1 Teacher
- Four student groups measured Nitrogen Dioxide using (NO₂) Diffusion Tubes over a two-week exposure period.
- Student groups developed campaigns seeking to engage parents, teachers, peers and local primary schools around air quality issues.

Key findings and results

- All readings were between 37-74 µg/m³.
- Following the two week exposure, 12 out of the 13 diffusion tubes recorded NO₂ that if averaged over the year would exceed the would exceed the annual EU legal limit of 40µg/m³.
- The majority of students travel to school by public transport. Interestingly, those who lived farthest away walked to school

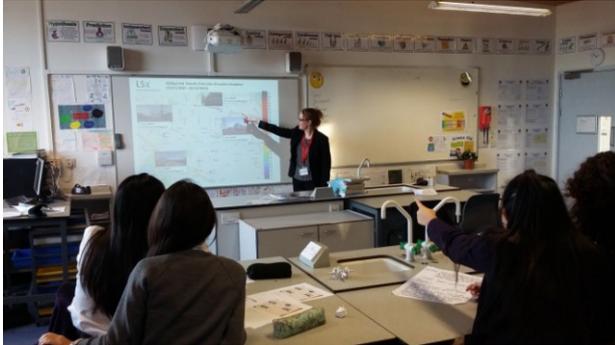
Key achievements

- There was a 500% increase in students wishing to travel to school by bike recorded in the follow-up survey
- In the baseline, 12 students responded that they are aware of their action in reducing air population compared to 17 in the follow-up. This indicate a 42% increase
- The majority of students (14/16) student indicated that they would recommend the programme

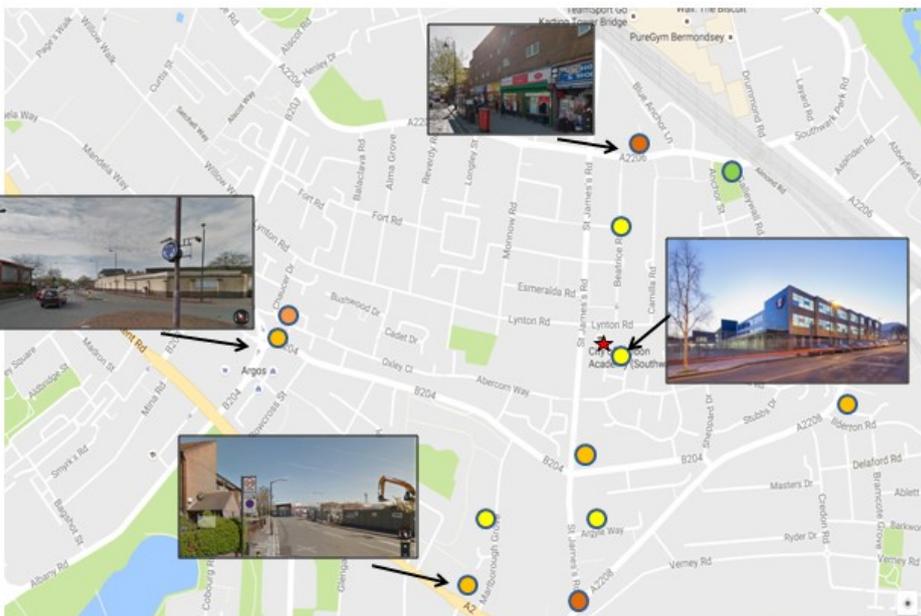
Achievements

- Teams made presentations to other classes in their year
- Created posters
- Will be writing to their local MP
- A school newsletter has been sent out highlighting the project

See Appendix 6.3 for recommendations for future action



"I have nothing to change about this project. I have learnt a lot about air pollution." - Year 9 Student, City Academy



NO2(μm^3) Results from City of London Academy (19/11/2015 -10/12/2015)

READINGS ARE A 'SNAP SHOT' OF THE AREA OVER A TWO WEEK PERIOD

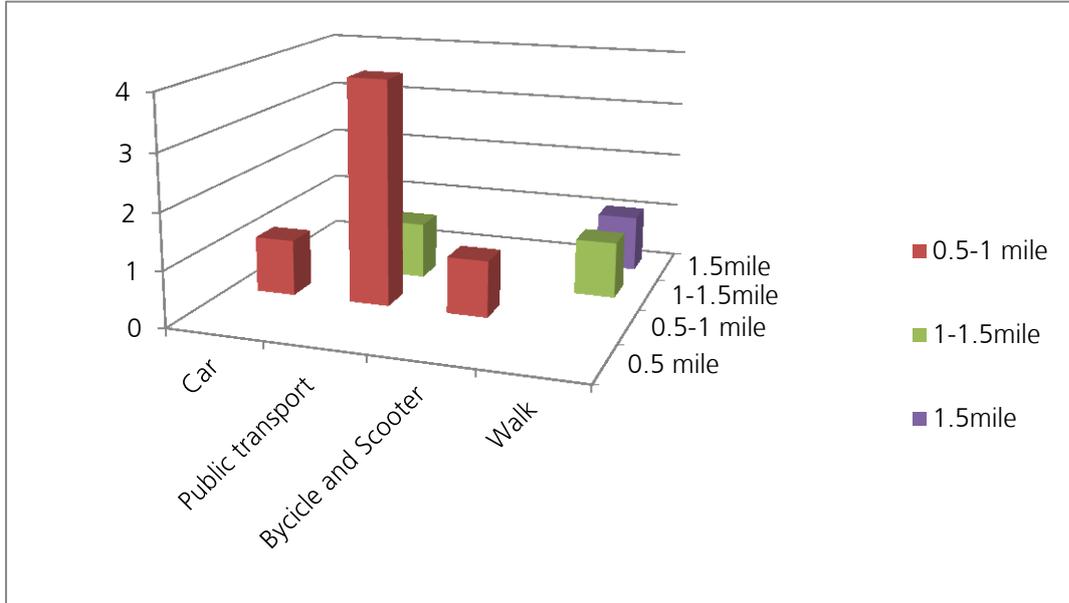
INDICATES VERY HIGH LEVELS OF POLLUTION

INDICATES HIGH LEVELS OF POLLUTION

INDICATES SAFE LEVELS OF

Nitrogen Dioxide (NO2) $\mu\text{g}/\text{m}^3$

Current travel methods (as recorded in the follow-up survey)



"I enjoyed this project because not only did I learn new things but was able to work with other people"
- Year 9 Student, City Academy

"I think the project was very insightful and gave me lots of knowledge"
- Year 9 Student, City Academy

"I really enjoyed the project. I learnt more about our and now my actions effect this"
- Year 9 Student, City Academy

5.4 Case Study: Harris Boys' Academy, East Dulwich

Peckham Rye, London SE22 0AT

Harris Boys Academy is an all-boys' school situated in Peckham Rye.



Overview

- Year 9 chemistry class of 8 students
- Two staff (Teachers)
- Two student groups measured Nitrogen Dioxide using (NO₂) Diffusion Tubes over a two-week exposure period.
- Student groups developed campaigns seeking to engage parents, teachers, peers and local primary schools around air quality issues.

Key findings and results

- Following the two week exposure, 8 out of the 12 diffusion tubes recorded NO₂ that if averaged over the year would exceed annual the EU legal limit of 40µg/m³.

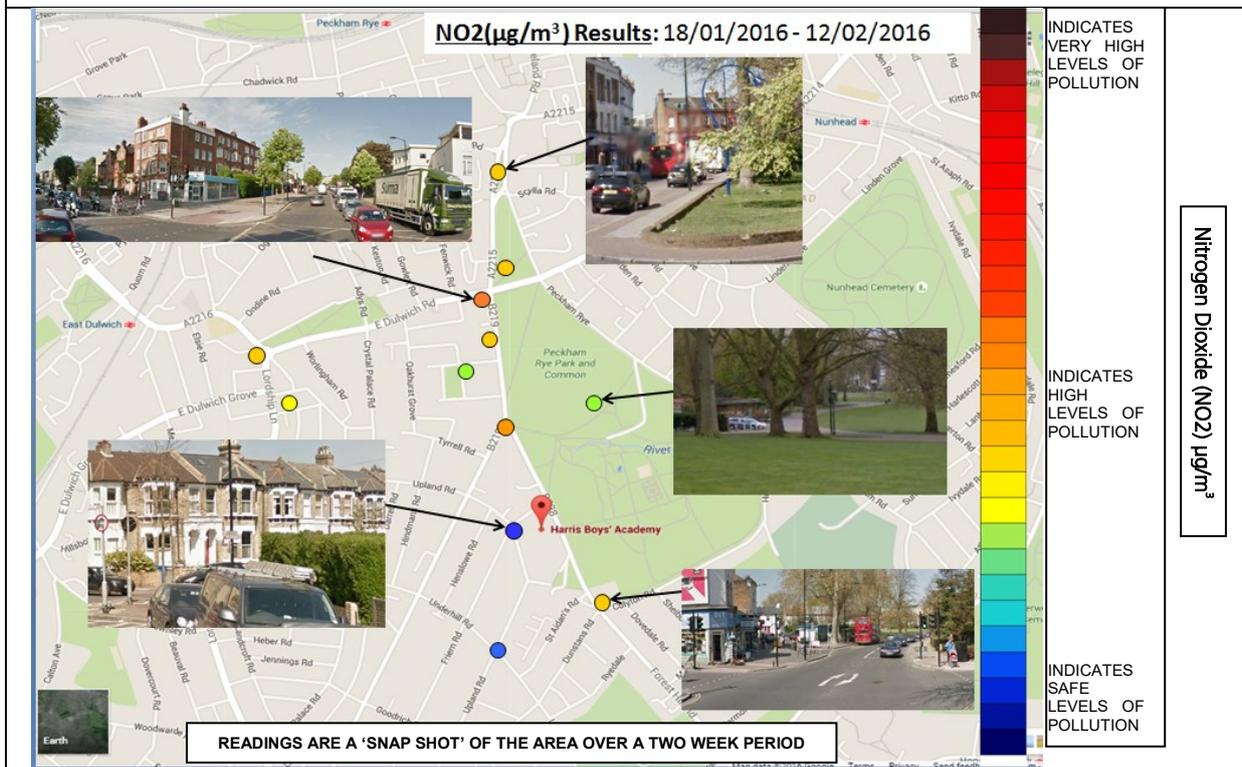
Key achievements

- In the baseline survey, the number of student who responded that their action reduce air pollution was recorded as 2 compared to 5 in the follow-up.
- 100% of students would recommend the programme to others

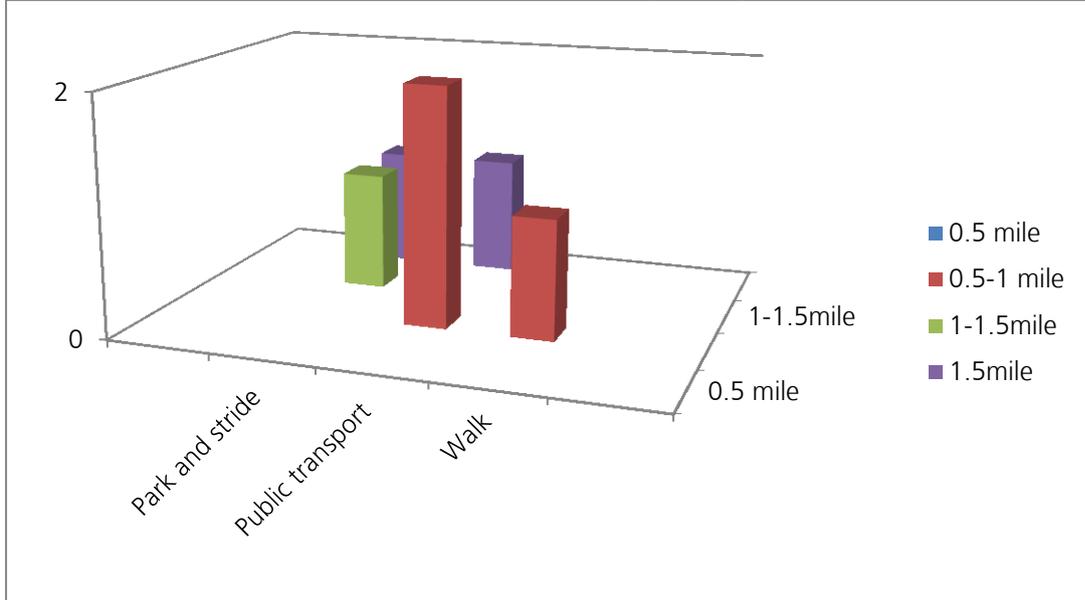
Achievements

- Successfully linked air pollution chemistry to health effects and presented with confidence.

See Appendix 6.3 for recommendations for future action



Current travel methods (as recorded in the follow up survey) and distance to school



"I found it interesting and incredibly informative/educational I have taken a lot away from it."
Year 9 Student, Harris Boys' Academy East Dulwich

5.5 Case Study: St Thomas the Apostle College

Hollydale Road, Nunhead, London SE15 2EB

St Thomas the Apostle College is a Catholic School for boys situated near Nunhead.



Overview

- Year 9 Geography and Science class of 24 students
- Two Staff (including Teacher)
- Five student groups measured Nitrogen Dioxide using (NO₂) Diffusion Tubes over a two-week exposure period.
- Student groups developed campaigns seeking to engage parents, teachers, and peers around air quality issues.

Key findings and results

- Following the two week exposure, 10 out of the 18 diffusion tubes recorded NO₂ that if averaged over the year would exceed annual the EU legal limit of 40µg/m with another 5 diffusion tube locations very close to exceeding.
- All students surveyed travel to school by public transport. Similar distances are 'walked'; by some of the other schools.

Key achievements

- The number of students wishing to travel to school by walking or cycling increased by 3/5th (2 students, 5 in total)
- Number of student from the baseline who indicated they know a lot about air pollution was recorded as 14 compared to 23 in the follow-up, which showed a 64% increase.
- Student who are aware of how their actions could reduce air pollution increased by 80%.
- 18/24 student indicated that they would recommend the programme

Achievements

- One group did a presentation including an animation on the impacts of air pollution²⁵.
 - A presentation by a group on strategies to reduce pollution through reducing the amount of bus stops.
 - One group of students performed a short play explaining the effects of measures such as planting trees and distance from the road on the level of air pollution.
 - Another group of students wrote a song to increase air pollution awareness and how you should communicate that to the wider community through campaigns.

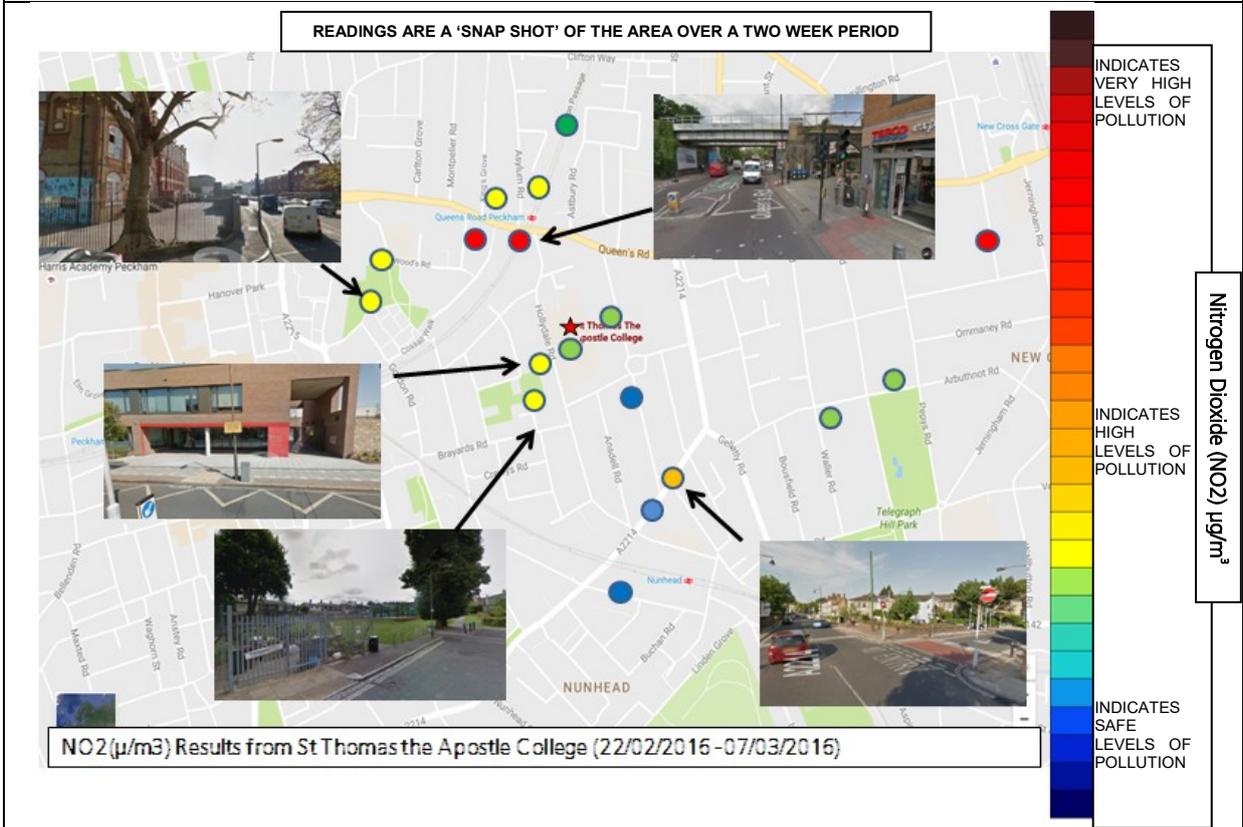


"I thought the project was flawless. I have enjoyed the past 3 lessons and at the same time learnt a lot"

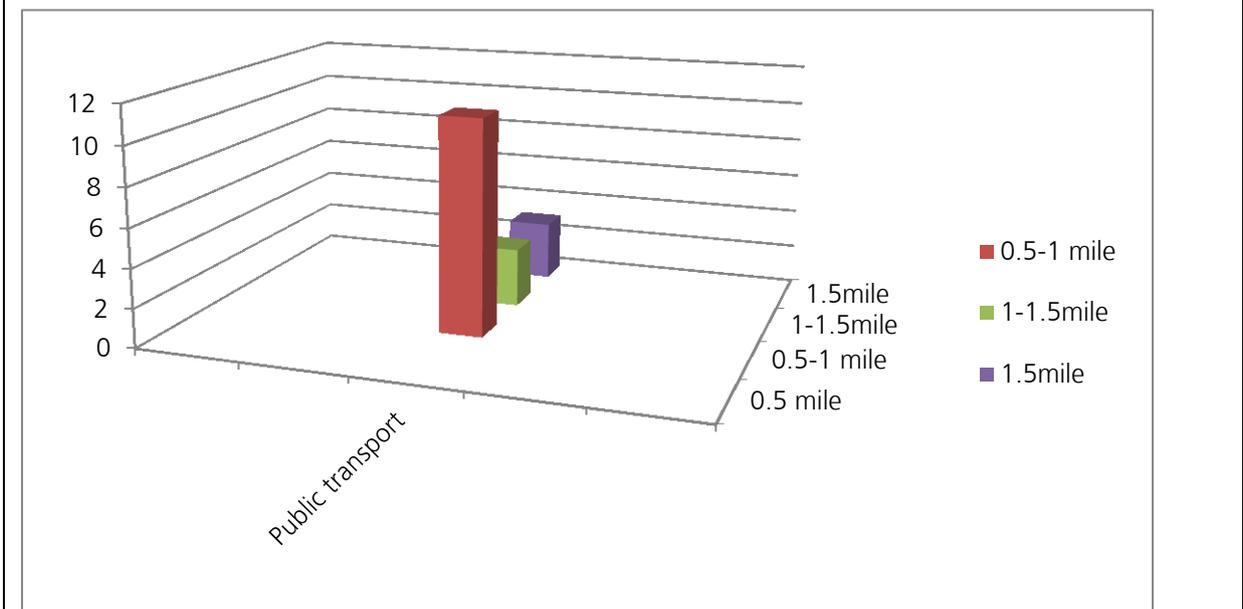
- Harrijon, Student, St Thomas the Apostle College

²⁵ Unfortunately LSx were unable to obtain a copy of the animation to include in this report

See Appendix 6.3 for recommendations for future action



Current travel method (as recorded in follow-up survey) and distance from school



6. APPENDIX

6.1 School Profile

	Notre Dame	St. Saviour's and St. Olave's	City Academy	St. Thomas the Apostle	Harris Boys Academy
School age range	11-16	11-18	11-19	11-16	11-18
Type of establishment	Voluntary Aided	Voluntary Aided	Academy Sponsor Led	Voluntary Aided	Academy Sponsor Led
Number of students	608	786	1262	593	753
Gender	Girls	Girls	Mixed	Boys	Boys

6.2 School Schedule

	Contact school	Schedule lessons	Baseline surveys	Citizen science	Data mapping	Campaigns	Evaluations
Notre Dame	Jul	Jul	30 th Sep	30 th Sep	4 th Nov	4 th -25 th Nov	25 th Nov
St. Saviour's & St. Olave's	Aug	Aug	12 th Oct	12 th Oct	16 th Nov	16 th Nov – 7 th Dec	7 th Dec
City Academy	Nov	Nov	5 th Nov	19 th Nov	21 st Jan	21 st Jan – 17 th Mar	17 th Mar
St, Thomas the Apostle	-	-	22 nd Feb	22 nd Feb	Mar	Mar-18 th Apr	18 th Apr
Harris Boy's Academy	Sep	Sep	25 th Jan	25 th Jan	22 nd Feb	22 nd Feb – 14 th Mar	15 th Apr

6.3 Case Study Recommendations

Notre Dame RC Secondary Girls' School

- Building on the strong desire to cycle and the improved cycling infrastructure in the area, the school should invest in cycle facilities and cycle training for all students.
- The content of this project should be presented to the wider school community through assemblies. Students were enthusiastic to let others know about air quality.
- Students who live less than 0.5 miles from the school should be encouraged to walk. It was acknowledged by the school that reliance on the bus for short journeys is problematic.

St. Saviour's & St. Olave's School

- Greater emphasis on walking to school could be encouraged; there is a high prominence of bus journeys within a distance that could easily be covered by walking. This pattern should be reversed with people living further away relying on public transport. Some students who lived furthest away purported to walk.
- Several students explained how there should be more awareness and care over this subject. The more people know about it, the more they will be able to make informed decisions and act upon it.
- Everyone wants cleaner air in the Old Kent Road area, whether that is through less polluting vehicles, increased cycling, more walking, electric vehicles, etc. Students were keen to cycle, but feel the area is too dangerous for them to do so. Some were asking for cycling safety lessons and others for safer, clearer bicycle paths.

City of London Academy Southwark

- Students would like to see more trees, gardens, parks and greenery on and around the school grounds. Specifically, many thought they should be encouraging the community to plant.
- Greater emphasis on walking to school could be encouraged; the students who purported to walk lived further away than those who took public transport. The school agreed that students should walk to school more often, based on the high number of bus journeys that are not strictly necessary.
- Building on the desire to cycle and the improved cycling infrastructure in the area, the school should invest in cycle facilities and cycle training for all students.

Harris Boys' Academy, East Dulwich

- The content of this project should be presented to the wider school community through assemblies. Students were enthusiastic to let others know about air quality.
- The students felt that they would benefit air quality messaging targeted towards their age group, celebrities such as Emma Watson were identified as appropriate ambassadors for this task.
- Students felt that the school could encourage more journeys by bus instead of car.

St Thomas the Apostle College

- Building on the desire to cycle and the improved cycling infrastructure in the area, the school should invest in cycle facilities and cycle training for all students.
- The school should encourage students that are within walking distance to walk to school, given the accessibility of the school student exposure to air pollution would be dramatically reduced by avoiding public transport and the main roads that they serve
- Students were enthusiastic to get in contact with local MPs.

6.4 Lesson Plans



Air Quality Investigation

for KS3 Geography

Unit of work: overview

In session one, your students will learn about the Great Smog of 1952 and the dangers of air pollution today. They will be introduced to the make up of the air we breathe and its most common pollutants. They will then investigate the causes of these pollutants and think about how physical signs of poor air quality can be seen in the landscape. Finally, they will use this knowledge to design a piece of fieldwork that searches for evidence of the levels of air quality in their local area.

Your students will then take part in a piece of fieldwork that looks for different species of lichen on trees. This fieldwork can be carried out as homework or completed in a separate session.

In session two, your students will start the session by learning about an example of successful citizen action against air pollution. They will then analyse and present the information gathered in the fieldwork using geographic information, reporting, images, charts and graphs. Finally, your students will select a course of action to take with the aim of improving the air quality of their local area.

Learning outcomes

- Collect, analyse and communicate with a range of data gathered through fieldwork that deepen their understanding of geographical processes
- Communicate geographical information in a variety of ways
- Interpret Ordnance Survey maps in the classroom and the field, including using grid references.
- Use fieldwork in contrasting locations to collect, analyse and draw conclusions from geographical data, using multiple sources of information.

You will need

- Scissors and sticky tack
- Maps of your local area
- A computer screen
- Internet access
- Risk assessment for fieldwork

Suggested minimum time

Two sessions of one hour plus additional fieldwork which can be set as homework or completed in a third session of one hour.



Air Quality Investigation

for KS3 Science

Unit of work: Overview

In session one, your students will learn about the Great Smog of 1952 and the dangers of air pollution today. They will be introduced to the make up of the air we breathe and its most common pollutants. They will then investigate the causes of these pollutants and think about poor air quality can be measured. They will learn about sampling and work scientifically to design an experiment that tests air quality in their local area.

In the second session, your students will then carry out an experiment that measures levels of nitrogen dioxide (NO₂) in a number of locations in and around your school grounds.

The third session must take place four weeks after the NO₂ diffusion tubes are placed. Your students will start this session by learning about an example of successful citizen action against air pollution. They will then analyse, critique and present the information gathered in their research. Finally, your students will select a course of action to take with the aim of improving the air quality of their local area.

NB: NO₂ diffusion tubes will need to be purchased for this unit of work. Testing nine sites with one control site costs £59.50 plus VAT* from Gradko (www.gradko.co.uk). Price includes analysis.

* Contact supplier for up-to-date cost.

Learning outcomes

- Ask questions and develop a line of enquiry based on observations, and make predictions using scientific knowledge
- Use appropriate techniques, apparatus and materials during fieldwork
- Make and record observations and measurements using a range of methods, and apply sampling techniques
- Biology: how organisms affect, and are affected by, their environment, including the accumulation of toxic materials
- Chemistry: the composition of the atmosphere, the production of carbon dioxide and other gases by human activity and their impact

You will need

- Scissors and sticky tack
- Maps of your local area
- A computer screen
- Internet access
- NO₂ diffusion tubes
- Risk assessment for fieldwork

Suggested minimum time

Three sessions of one hour. The second of these sessions involves fieldwork.



Air Quality Investigation

for KS3, KS4 or KS5 Citizenship

Unit of work: Overview

In session one, your students will learn about the Great Smog of 1952 and the dangers of air pollution today. They will be introduced to the make up of air and its most common pollutants. They will investigate the causes and effects of these pollutants. They will then think about how to find evidence of poor air quality and use this learning to design a piece of research that searches for pollution in their local area.

Your students will then take part in a piece of research that looks for different species of lichen on trees. This research can be carried out as homework or completed in a separate session.

In session two, your students will start the session by learning about an example of successful citizen action against air pollution. They will then analyse and present the information gathered in their research. Finally, your students will select a course of action to take with the aim of improving the air quality in their local area.

Learning outcomes

- Knowledge and understanding of how citizens can participate actively in the democratic systems
- Develop an interest in, and commitment to, participation in volunteering as well as other forms of responsible activity
- Learn about and take part in the ways in which citizens work together to improve their communities
- Provision of opportunities to participate in school or community-based activities

You will need

- Scissors and sticky tack
- Maps of your local area
- A computer screen
- Internet access
- Risk assessment for fieldwork

Suggested minimum time

Two sessions of one hour plus additional fieldwork which can be set as homework or completed in a third session of one hour.



Air Quality Investigation

Travel Planning and Community Campaigns

Overview

This Air Quality Investigation can be done in class, as an extra-curricular activity or given to a group of older students for independent study. Both sessions are designed to be stand alone: you can choose to do either one or both.

The surveys in either of the sessions can be used to provide a snapshot of air quality and transport attitudes. Alternatively, the results can be used as a baseline for a series of surveys that measure the impact of any actions your students, school or community take.

In session one, students will learn about indoor and outdoor air pollution, then carry out an Air Quality and Transport survey. They will use this information to create a plan of action to present to your Head Teacher or Governors.

In session two, students will learn about air pollution on the high street, then survey shoppers and shop-keepers on their local high street about their habits and attitudes to air pollution. They will then use this information to start an air quality campaign in their community.

Learning outcomes

These sessions have been designed to follow on from the Science, Geography and/or Citizenship Air Quality Investigations. The sessions can also be delivered as a stand alone project for schools that are looking to get their students involved in their School Travel Plan or interested in volunteering and community action.

You will need

- Print outs of survey worksheets
- Map of your local area
- Map or floor plan of your school
- Coloured sticky dots
- A computer screen
- Internet access
- Risk assessment for fieldwork

Suggested minimum time

Both sessions will take around 90 minutes each and can be broken into 30 minute segments.

6.5 Further Resources

Aspect	Example
What What behaviour are you targeting	<i>Less people should idle their vehicles' engines</i>
Why Why are you targeting this behaviour	<i>Map shows high NO₂ readings near parking spaces</i>
Who Who are you targeting	<i>Taxi drivers who idle their engines whilst waiting</i>
Barriers What barriers do you foresee	<i>Divers do not know (or care) about air pollution</i>
How How will you communicate your message?	<i>Drivers must be educated about pollution, and taught that they could save money on diesel by switching their engines off</i>
Measurement How are you going to measure change	<i>No. Taxis idling, reduced number of taxis idling</i>

Data	What is it?	How is it collected?	Example
Quantitative	Deals with 'quantities' or numbers, asking questions like 'how much?', 'how many?' and 'how often?'. Things are either measured or counted	questionnaires (close-ended questions), surveys, observations, experiments	Survey , Number of retweets/'likes'/ views, number of people spoken to, number of people walking etc.
Qualitative	Tells you about 'qualities' such as personal reactions, feelings, impressions and responses.	Interviews, focus groups, conversations, meetings, case studies, extracts from newspapers	Interviews, focus groups, conversations, meetings, case studies, extracts from newspapers

Quan vs Qual

Quantitative data		Qualitative data	
Pro	Con	Pro	Con
Can capture large numbers of people	Better for measuring rather than explaining	Rich 'human interest' information can be captured	More time consuming to conduct, understand and analyse
Provides numerical measures / stats / 'facts'	Hard to measure intangible benefits	Can help explain WHY	Small groups of people
Can calculate impact reach, viewer/readership	Can be difficult	Can tackle complex issues	Doesn't produce 'facts' or stats

Creating your air quality behaviour change campaign

Group Name:	
What What behaviour are you targeting Remember it's all about improving air quality or reducing exposure	
Why Why are you targeting this behaviour	
Who Who are you targeting Consider why you are targeting this group	
Barriers What barriers do you foresee Put yourself in their shoes, what do you think they would this say? Why are they doing or not this already	
How How will you communicate your message? Remember to utilise the behaviour change techniques	
Measurement How are you going to measure change Remember! Measurement doesn't just happen at the end	
When!?	

6.6 Visual Media Examples – Notre Dame Leaflets (English & Spanish)



What is Air Pollution?

Air pollution is a substance that is harmful to any living organism such as an animal, plant or bacteria. Air pollution isn't just a threat to our health, it also damages our environment. Pollution is created by cars, buses, trains, factories and power plants. For example, buses produce pollution because the heavier the bus is, the more harmful chemicals are released - this is pollution.



Feedback

Thank you for reading this booklet and we hope you have learnt a lot! We would be very grateful if you would give us some feedback on our presentation!

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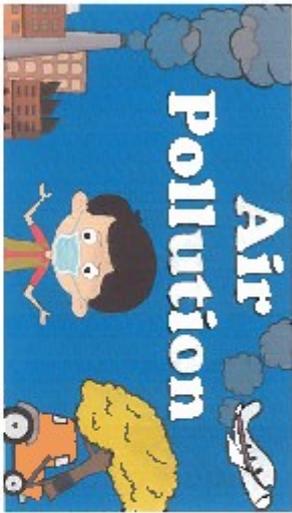


Air Pollution

Leaflet made by Maya Madulke

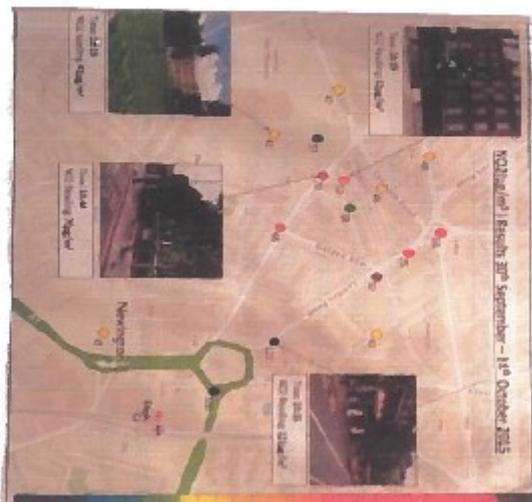
What this presentation is about

This presentation is about pollution and how it affects our planet and how it can be improved what you can do to help. The pollution in London is very high, in this booklet you will understand what are the causes of it being so high.



What is being done about it

There are many things that can be done for improving air quality. For example walking or cycling to school instead of taking the bus, using environmentally friendly products, recycling items such as paper, plastic, glass bottles, cardboard or cans can really make a difference



In this graph we can see that the air pollution is higher near the bus stops but less polluted near the parks. This could be because the traffic is bad round the bus stops causing the buses having to wait. This means more harmful chemicals are released into the air in that area because the engine is still on while the bus waits in traffic.

Qué es la contaminación

atmosférica ?

La contaminación del aire es una sustancia que es perjudicial para cualquier organismo vivo , como un animal, planta o bacteria. La contaminación del aire no es sólo una amenaza para nuestra salud , también daña nuestro medio ambiente. La contaminación es creada por los coches, autobuses , trenes , fábricas y plantas de energía . Por ejemplo , los autobuses producen contaminación debido a que el más pesado el autobús es , los productos químicos más dañinos son liberados - esto es la contaminación



Su opinión

Gracias por leer este librito y espero que haga aprendizaje mucho! Estaremos muy agradecidos si usted nos da su opinión sobre nuestra presentación.

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Contaminación Del

Aire

Traducido por Nayeli Milienka

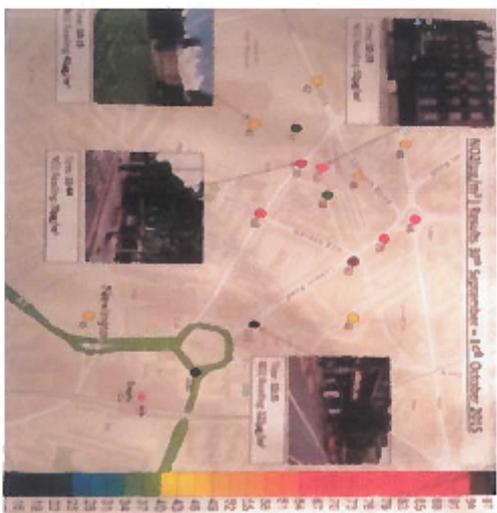
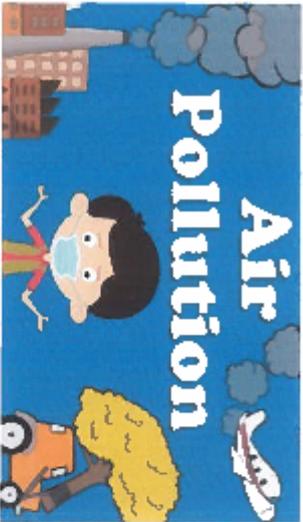


Lo que esta presentación se trata

La presentación es sobre contaminación y cómo afecta a nuestro planeta y cómo podemos mejorar y ayudar para que estemos en un mundo limpio. En este libreto ustedes van a entender cómo y porque las contaminaciones está muy alto.

Lo que se está haciendo

Hay muchas cosas que podemos hacer para mejorar la calidad del aire, por ejemplo caminar o ir en bicicleta al colegio es bes de tomar el bus . También reciclar objetos por ejemplo papel, plástico , botellas de vidrio , cartulina o latas, esto puede hacer una gran diferencia en el mundo.



En este gráfico podemos ver que la contaminación del aire es más alta cerca de las paradas de autobús, pero es menos contaminado cerca de los parques. Esto podría deberse a que el tráfico es malo por las paradas ocasionando que los autobuses se queden esperando por mucho tiempo. Esto significa más productos químicos nocivos se liberan en el aire en esa zona debido a que el motor todavía está encendido mientras el autobús espera en el tráfico.

6.7 Air Quality Conference

A Fresh Perspective on Clean Air - *Focused workshops on air quality in London*

This conference took place on 30th June 2016 and aimed to develop and inform a new vision for London from an environmental perspective, focusing on air pollution. Marking the 60th anniversary of the Clean Air Act, this event brought together academics, community groups and policy makers at the forefront of the fight for clean air to share their work, ideas and enthusiasm for air quality solutions.

During the afternoon, robust solutions were explored for tackling air pollution through law, policy, technology, behaviour change, sustainable transport, data sharing and community empowerment; discussions took place on how citizen science can help communities; and new ideas and solid actions to improve air quality were developed.

Pupils from Notre Dame Secondary School were invited to talk about the CA4S programme and their experiences with air pollution and what they discovered through their investigations into Air Quality. Not only did they contribute valuable insights into their experiences of air quality issues in London, they used the creative approach of producing a song about air pollution to highlight this important issue and feed into discussions about how communities can get involved to tackle the problem.