Climate Change Schools Project

Final evaluation report

July 2009

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- The North East Climate Change Partnership
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- The Association of North East Councils

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Laura Grant and Helen Featherstone, July 2009

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Introduction

The Climate Change Schools Project (CCSP) brings together organisations, schools and teachers around the North East to support a novel approach in bringing climate change to the heart of the national curriculum. The CCSP has established a network of 'Climate Change Lead Schools' who, in 2008-2009, consisted of 80 schools across North East England. Thousands of young people took part, representing a minimum of 14,000 hours of climate change related activity across the schools.

Activity centred around a specially designed set of 'Climate Change Lead Schools Modules' which was developed in the first half of 2008 by North East school teachers around six themes of climate change (e.g. climate change science, climate change and the media, indicators and impacts of climate change, climate change mitigation and climate change adaptation).

The project had the following aims:

- To establish the 'Climate Change Lead Schools' network;
- To develop an adaptable and creative climate change framework for Key Stages 2 and 3 that may be successfully rolled-out to other regions in the country following the 2008 – 2009 school year via the CCSP partners;
- To raise awareness and understanding of climate change for young people;
- To promote the North East as the country's centre of excellence in terms of climate change teaching, learning and positive action.

The scope of the evaluation was to *explore the outcomes* of the pilot project. The evaluation explored impacts on students' knowledge, attitudes and behaviours about climate change, to what extent students influence their peers and families and the ways in which these dimensions are linked.

Changes were measured quantitatively (using a before-and-after electronic survey with Year 5 students that took part in the project (n=92), Year 5 students that didn't take part (n=48) and Year 7/8 students (n=34)) and qualitatively through six focus groups with students (n=36).

Knowledge

In Year 5, students had little prior knowledge about climate change. The quantitative work indicates that students that participated in the project had achieved several learning outcomes that their counterparts in the control group had not. However there were also some misconceptions that had crept in, notably the role of the ozone layer in climate change, and confusion between general respect for the environment (e.g. not dropping litter) and climate change mitigation. Year 8 students also scored considerably higher at the second stage, but the e-survey sample size was too small to measure the changes statistically.

The qualitative work has identified that the main messages about what climate change is and the implications for the planet appear to have been communicated clearly.

> *"I think it was a good bit of learning because we learned more because we had opinions, but we would think what we think and be educating them. But then everyone else started talking and we found education from them as well. The question for them might be a bit more burning, as well." (Year 7)*

Attitudes

Significant (positive) shifts in responses to four of the attitudinal statements were observed for Year 5 students, that were not observed in the control group. At the second stage, Year 8 students were more likely to accept the idea that climate change is a risk to them and that it will kill plants and animals.

There was a subset of younger students who became quite anxious about climate change, and some with worrying misconceptions about the world ending. This appeared to be prevalent in certain classes rather than across the board and is likely to have been influenced by a range of factors within and outside the project. This did not appear to be an issue at Key Stage 3.

Students' lack of prior knowledge about climate change and their attitudes towards it were closely linked. In the focus groups, many students described how they felt when they learned more about the topic:

> *"Well when I first started learning about climate change, I was like great, I used to say it doesn't bother us, I don't care, I'll be long gone before it affects us and then like when I've started to see like in fifty years it kind of makes you go oops and stuff so I've kind of changed my view towards it." (Year 8)*

> *"…we're glad that we're being taught about it because we need to know about it, we need to know about the environment because then we can help to save it." (Year 5)*

Behaviours

Quantitatively, only a few significant changes were observed in the self-reported behaviours and students' attitudes towards them in Year 5, however this was against a backdrop of students in the control group reporting doing these actions less frequently over the period of the study. The comparator group was small, but this indicates that sustaining and improving behaviour is a strength of the project.

In Year 8 the sample size was small, but responses indicated that earlier in Year 8 students were more likely to act in a climate-friendly way and also want to do more climate friendly actions. Later in the year the frequency of the actions appears to have been reduced, and students were happier with the reduced frequency. However students were more likely to encourage others to do almost all of the climate friendly behaviours listed at the second stage compared to the first. These contradictory messages hint at the complex relationships between students' understanding of and attitudes towards climate change itself and their attitudes towards and participation in 'climate-friendly behaviours'.

While the before-and-after results hinted at some trends, clearer patterns emerged when students were asked qualitatively to report on changes in their behaviour. Students reported changes related to sustainable transport, recycling and conserving energy:

> *I like to walk to school now instead of bagging a lift in the car. (Year 5)*

> *Well my family agreed that I should walk half way to school because I live quite far from school (Year 5)*

> *I am turning off electrical sockets of (tellys, sockets and computers) (Year 5)*

> *I recycle a little bit now (Year 8)*

In the focus groups, individual students were prompted to discuss how their actions had changed, and as well as reiterating the themes about transport, recycling and energy, many explained how they had discussed climate change with others, and influenced their behaviour:

"Instead of putting it in a bin, they put it in, if there's a recycle bin in the class. I say, "Couldn't you put in the recycling bin?" and we so recycle a lot." (Year 7)

"I got on their backs about using so much stuff. And now me dad instead of generally dropping me mum off at work and then taking the car to go on his bike." (Year 8)

"My mum always leaves the door open at my aunt's house. And I keep telling her she's not heating up the street" (Year 5)

Crucially, it appears that families and schools have been supportive of the behavioural changes, for example by providing recycling facilities and discussing travel options with students. This is key to helping students feel empowered to make climate-friendly changes to their behaviour.

Teachers

Teachers identified a range of objectives for taking part in the CCSP, including their own commitment to climate change and the opportunity for CPD. Many also commented that the project itself was attractive as a way to improve the teaching of the subject and an opportunity to work with other schools and Science Learning Centre North East.

Few, if any, teachers delivered all of the material. Many described 'dipping in and out' of the Modules to suit their classes and schools. In fact this flexibility was seen as a strength of the approach.

Teachers' comments in their case studies supported the impacts identified in the student research. This was especially true of the behavioural impacts, teachers reported talking to parents that had been subject to their children switching off household appliances and one school had seen a noticeable reduction in the school energy bill.

A summary of successes and challenges identified teachers is provided below:

Successes	**Challenges**
• The Module materials and knowledge base: easy to use and written by teachers • The network support and ability to collaborate with other teachers • Flexibility to deliver some or all Modules and activities • Creative, self-directed activities that were engaging and encouraged students to look at the issues from different perspectives • The depth of the project compared to one-off activities (especially at KS3) • Delivering activities off-timetable • Students' enthusiasm	• Time constraints were a major barrier, especially at KS3 • Trying to fit it all in to the curriculum! A few were 'overwhelmed' with the potential amount of material • Lack of resources for Foundation, Y1 and Y2 • Not all websites were accessible • Getting to SLCNE not always convenient • For some teachers, the full SoWs limited flexibility

For many teachers, the project complemented other initiatives taken by the school, such as Eco Schools or Sustainable Schools. All teachers valued the project and all intend to continue the work in future, with many planning to extend the activities through delivering more Modules, by taking students off-timetable or rolling activities out by training other staff in school (some teachers had already delivered INSET in their schools).

Conclusion & recommendations

This study highlights the complexity of teaching a subject like climate change in schools, and underlines the interrelationships between knowledge, attitudes and behaviours. There is no doubt that the approach to incorporating activities into the curriculum is a valuable one. By comparison with enrichment approaches, it allows material to be covered in greater depth, with a range of activities that appeal to students' diverse learning styles. Continuing to bring teachers together to discuss approaches will continue to enhance delivery.

The outcomes of this evaluation in the wider context of scientific literature endorses that the approach taken by the CCSP, while not without challenges in this complex area, is an effective way to teach students the realities of climate change and empower them to take action in their own lives and influence others.

Recommendations for the Modules:

- Review the suites of activities in each Module to respond to student (and teacher!) feedback;
- Introduce mechanisms to identify any misconceptions at the end of each module, perhaps through games or quizzes;
- Be aware of students' concerns at Key Stage 2 and plan activities that allow them to share these concerns in a safe way, so they can be addressed;
- Build on the network of teachers and schools to allow the activities to evolve and experiences to be shared. Consider co-developing some activities with students as well as teachers.
- Identify some engagement and enrichment opportunities for each Module to enhance students' learning.

Recommendations for the CCSP as a whole:

- Capture and communicate the various ways that teachers have delivered activities, highlighting flexibility;
- Continue to explore ways to support and add value to the Lead Schools network;
- Encourage Lead Schools teachers to support new teachers that are coming on board;
- Build in a sustainable evaluation strategy for future activity.

1 Introduction

1.1 Background

In recent years the public discourse around climate change has changed dramatically. Political parties jostle to demonstrate their green credentials through commitments to reduce carbon emissions. In 2008, there were as many news articles in two months as there had been a decade earlier for the whole year; artists have been responding to climate change through exhibitions such as The Ship, and the action film 'The Day After Tomorrow' uses hypothetical rapid climate change as the central stimulus for thrills and danger (Featherstone, 2008).

This dramatic shift is possibly in response to a number of factors, each influencing and reinforcing the other. The Intergovernmental Panel on Climate Change (IPCC) published its fourth report in 2007 presenting ever stronger evidence of the anthropogenic influence on the changing climate (IPCC, 2007). The year before this, the Stern report presented a convincing economic argument for responding to climate change to reduce its impact rather than deal with the consequences of unchecked climate change (Stern, 2006). Alongside these influential reports are EU targets to reduce carbon dioxide emissions and achieve sustainable development, and in the UK, the imminent end of the current suite of nuclear power stations (DTI, 2007b) are all acting together to force attention to the changing climate, its impacts and appropriate responses.

The Climate Change Act of 2008 commits the UK to cut 80% of its greenhouse gas emissions by 2050. The new bill also seeks to ensure that the country is well-adapted and resilient to both current and future changes in climate. The UK has now become the first country in the world to have agreed to such a legally binding framework on climate change policy. The UN Climate Change Conference in Copenhagen (COP15) planned for December 2009 aims to achieve a new global climate change agreement following on from the Kyoto Protocol. Also in Copenhagen this autumn and linked to COP15, the first Inspiring Climate Education (ICE09) conference for teachers and educators highlights an increasing focus on schools and education.

This greater emphasis on climate change discourse in the public arena is important for two reasons: firstly, because the impacts of climate change are going to affect many millions of people. With over 50% of the world's population living in coastal zones, a small increase in sea level as a result of thermal expansion and melting glacier ice has the potential to dramatically shape future events (Houghton, 2004). Changes in the availability of fresh water, food growth and the destruction of homes and farmland are predicted to have adverse affects on human behaviour, health and wellbeing (McMichael and Woodruff, 2004; NERC, 2005). While it is impossible to attribute single extreme weather events to climate change, the heatwave in Europe in 2003 killed over 35 000 people (Battacharya, 2003), and the flooding in the UK in 2007 resulted in insurers paying out over £3 billion (Association of British Insurers, 2007). Events like these are projected to increase in frequency and severity as changes to the climate continue.

The second reason why a change in public discourse around climate change is welcome is that dealing with climate change will necessarily involve the citizens of the world (Kasemire 1999, cited in Stoll-Kleeman, Renn, 1999, Lorenzoni, 2007). Policy decisions which aim to reduce carbon emissions will affect individuals (Trumbo and Shanahan, 2000) – for example changes to the public transport, infrastructure, changes to house-building and house renovation regulations and local vs globally sourced goods will affect each and every one of us. Alongside policies for reducing greenhouse gas emissions are policies for adapting to and living with the changing climate. Flood defences for towns, cities and individual homes will have to be implemented, emergency responses to extreme weather events will have to be planned and energy supply systems which are capable of being off-grid will need to be

developed. Planning will also need to be in place for water supply during times of drought, and areas of respite for those suffering heatwaves will also need to be considered.

While there have been many attempts to communicate climate-friendly behaviour messages to the UK public at large, there are many barriers to adults undertaking the desired low-carbon behaviour (Lorenzoni et al, 2007; Downing and Ballantyne, 2007; Featherstone, 2008). Research has shown that these barriers come about for varied and complex reasons including: conflicting messages from the many sources encountered on a day to day basis, routinised behaviour making it difficult to adopt new low-carbon behaviour, perceived lack of facilities and a feeling that living a sustainable lifestyle is not normal (Featherstone, 2008, Lorenzoni et al, 2007).

While it is difficult to remove these barriers once they are ingrained, it could be argued that it is better to not let them appear in the first place. This means tackling issues of sustainable lifestyles and climate change in primary and early secondary school. Students at school are in a unique environment where communications around low-carbon behaviour and facilities combine to enable pro-climate behaviour. A whole school acting in a climate-friendly manner can ensure that this type of behaviour is seen to be normal and not something different or difficult.

This rather closed environment makes it an arguably unique situation where communications about climate change can work together to influence not only knowledge of climate change, but attitudes to and behavioural responses to it. It is rare that communication campaigns aimed at adults can ever address all three areas and as such rarely have the desired impact of dramatically reducing individuals' greenhouse gas emissions. Indeed, the latest UK government communication campaign only ever aimed to achieve attitudinal change (DEFRA, 2006b). It is not clear why this was the case - it could be an attempt to create space for policy change or it could be the foundation for another campaign around behaviour change in years to come.

Research into who people listen to and are influenced by (whether for information on climate change or the latest shampoo to buy) repeatedly demonstrate that close acquaintances and family are trusted as reliable sources of information regardless of their expertise. This role of close friends and family in influencing behaviour does not have to take the form of adults influencing children. Indeed many adults cite their children or grandchildren as affecting their behaviour choices, particularly when it comes to actions in the home which can reduce their environmental impact (Featherstone, 2008).

This certainly suggests a case for enhancing students' knowledge and understanding of climate change in school and empowering them about climate-friendly behaviours.

1.2 The project

The Climate Change Schools Project (CCSP) brings together organisations, schools and teachers around the North East to support a novel approach in bringing climate change to the heart of the national curriculum. The CCSP has established a network of 'Climate Change Lead Schools' who, in 2008-2009, consisted of 80 schools across North East England. Thousands of young people took part, representing a minimum of 14,000 hours of climate change related activity across the schools.

Activity centred around a specially designed set of 'Lead Schools Modules' which was developed in the first half of 2008 by North East school teachers (Modules were tested over the summer 2008 term prior to the launch of the Lead Schools in October 2008). The Modules were focussed on Key Stages 2 & 3, although the flexibility with which they were created meant that schools wishing to deliver activity on a wider audience age range could do so with relative ease.

Modules were produced around six themes of climate change (e.g. climate change science, climate change and the media, indicators and impacts of climate change, climate change mitigation and climate change adaptation). Modules consisted of curriculum webs and schemes of work provided at a detailed level including suggested activities and resources which would allow a teacher to deliver the activities as outlined, or to adapt the material to best suit their own learners. The latter was encouraged throughout the duration of the project to promote that any school could take part in their own unique way. Lead Schools were also encouraged to use their role as a Climate Change Lead School as a catalyst to encourage involvement in wider climate change and sustainability related activity.

CCSP partners include Science Learning Centre North East (part of Durham University), the Environment Agency and Northumbria Regional Flood Defence Committee, the North East Climate Change Partnership, the North East Strategic Partnership for Sustainable Schools, One World Network North East and the Association of North East Councils.

The project had the following aims:

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- To promote the North East as the country's centre of excellence in terms of climate change teaching, learning and positive action.

The scope of the evaluation was to explore the outcomes of the pilot project that was delivered in the 2008-9 academic year. This final report details the findings of the CCSP's evaluation.

2 The evaluation

2.1 Evaluation questions

The evaluation will address the following questions:

1. What was the impact of the interventions on the knowledge, attitudes and behaviours around climate change?
2. Did the impacts differ between Key Stage 2 and Key Stage 3 students?
3. What are teachers' opinions about the interventions?
4. Did the interventions and subsequent changes in students have an impact on young people's families?
5. Which were the most memorable and successful interventions and why?
6. To what extent did combining or delivering activities within the framework add to (or detract from) their impacts?
7. What good practice and learning can be taken forward into the next phase of the project?

2.2 Methodology

Central to the study is a *before and after survey* of students' knowledge, attitudes and beliefs around climate change and environmental issues. In addition, six *focus groups* with students were conducted. Moreover, the CCSP Officer collected pupil and teacher Module evaluations throughout the year, as well as end of year teacher 'Case Studies' to permit reflection of how the Lead Schools year had gone.

2.2.1 Questionnaire survey

The evaluation includes a large scale before and after survey. The first stage was administered between November and February 2008-9 (prior to teachers delivering the Modules) and the second stage was completed during May 2009. Responses before and after the intervention were compared statistically. The instrument has been adapted slightly to produce different versions for KS2 and KS3, but the content is essentially the same.

Existing literature was used to develop the survey. For example, research indicates that 'green' behaviour is linked to attitudes towards behaviours (such as recycling) rather than attitudes towards the wider issues (such as climate change) (Aizen and Fishbein, 1980). Existing scales were used as a starting point: the most widely used is the New Environmental Paradigm, which is designed for adults but has been successfully adapted for use with young people (Evans et al., 2007). For behavioural outcomes, we drew on the DCSF's 8 doorways framework for Sustainable Schools.

At the second stage, students were asked an additional set of questions about the project itself. This meant that all students that responded at the second stage could be included in this 'evaluation sample', regardless of whether they had completed the initial questionnaire.

The e-surveys were piloted in June 2008 with 60 Year 5 and 116 Year 8 students to help refine the instruments. The Year 5 teacher responsible for administering the surveys was also interviewed to offer feedback.

A crucial point is that the pilot was conducted with students at the end of Year 5, so we expected to see higher levels of literacy and scientific knowledge than for students starting Year 5 in September 2008.

Several changes were made as a result of the pilot. In the Year 5 survey, some of the responses were made easier to understand. The major changes were in the behaviours section, where response scales were simplified and the number of items was reduced. This part of the survey was also split into several sections to make it easier to complete.

Overall, the language used in the two surveys appeared to be accessible for the age groups.

Most schools were able to complete the survey electronically, which was the most environmentally friendly approach! However some schools had difficulties accessing the survey website, which was problematic.

The Wilcoxon signed ranks test was used to explore trends in the ordinal data sets, comparing how responses from the same students before and after the intervention differed. The test ranks paired responses and compares the number of positive, negative and neutral ranks to calculate the correlation coefficient. In addition, Kendall's tau b statistics were used to explore whether differences between the survey and control samples were significant, and to explore differences in responses between males and females.

2.2.2 Focus groups

The questionnaire survey aimed to quantify many of the outcomes from the project. However, such data will not give much evidence about why the project had the impact it did. Evaluators describe these as 'intervening mechanisms': essentially understanding which characteristics of a project led to particular outcomes and why. If the project is to be scaled up for national rollout, an understanding of these mechanisms is essential.

Focus groups are an ideal way to explore what it was about the project that caused students to change (or not change!) their attitudes or behaviours. A total of six focus groups were convened with students in Year 5 (4 groups) Year 7 and Year 8 (1 group each)

3 Evaluation sample

Year 5 and Year 8 were selected as sample year groups for the evaluation as students do not have major examinations in these years and they are at the mid-point of the relevant Key Stages. Thirty-three schools were recruited into the study (25 primary and 8 secondary). An additional 8 schools (7 primary and one secondary) were recruited as control schools – identified by local authorities as having similar demographics to the survey sample schools. The goal was to achieve a sample size of 2-300 for each group.

The final samples used in the evaluation were:

- **Y5 and Y8 study samples**: students that completed the questionnaire twice, both before and after taking part in Lead Schools activities
- **Y5 control sample**: students that completed the survey twice, but were not a participating as a Climate Change Lead School so did not take part in the Modules (this was designed to explore the impact of climate change or other activities in the normal curriculum at this age)
- **Y5 and Y8 evaluation samples**: students in the study samples, *plus some students who completed the e-survey at the second stage only*, where they were asked to report on their own experiences and learning.

3.1 Questionnaire survey

While many students completed the surveys at the first stage, considerably fewer completed it at the second stage, and still fewer had completed the survey at both stages, which means that the numbers contained in the study samples (where students had to have completed the survey twice) were low. This is disappointing given the effort that so many teachers went to at the first stage.

Study and control	Males	Females	Total
Y5 study sample (before + after)	48	43	**92**
Y5 control sample (before + after)	13	34	**48**
Y8 study sample (before + after)	15	19	**34**

Evaluation samples	Males	Females	Total
Y5 evaluation sample (after only)	95	85	**181**
Y8 evaluation sample (after only)	32	36	**68**

NB male and female figures do not total 100% because some respondents left the question response blank.

Students in the study and control samples completed the e-survey twice: both before and after the intervention.

The evaluation samples are of all students that participated in the intervention, but completed questionnaires at the second stage only. The second stage questionnaire included some questions about the project, which were relevant whether or not students had completed the first stage questionnaire.

A large number of surveys were collected at the first stage (Y5 study: 417, Y5 control: 105, Y7/8 study: 261). Unfortunately many schools did not complete the survey again at the second stage, and for some that did, different students completed the surveys.

However, the numbers are large enough for statistical tests to be performed on the Y5 study and control samples, and to have reasonable sample sizes in the evaluation groups.

71% of the Year 5 control group students said that they had covered climate change in lessons between completing the two surveys. So the comparison between the groups can be considered as a comparison between the impact of Lead Schools activities and climate change content that may be covered in school during Year 5 anyway.

3.2 Focus groups

Six focus groups were conducted in total, four with Year 5 students, one with Year 7 students and one with Year 8 students.

4 E-survey findings

4.1 Cognitive impacts

4.1.1 Year 5 findings

Students were asked to respond to 10 questions in a 'climate quiz' at both stages of the survey. Findings are presented in the tables below:

Year 5 study group

Question	Before		After		p
	% *correct*	% *incorrect*	% *correct*	% *incorrect*	
Which greenhouse gas is produced by burning fossil fuels?	64	36	59	41	.398
Which of these is a RENEWABLE energy source?	45	55	55	45	.123
What do scientists think is the main cause of climate change?	37	63	52	48	.028*
How do trees affect global warming?	41	59	47	53	.289
Which of the following is NOT a greenhouse gas?	21	79	7	93	.005**
What would Earth be like if there were no greenhouse gases at all in our atmosphere?	14	86	32	68	.005**
Which releases the most greenhouse gases per person?	26	74	20	80	.336
What does 'carbon neutral' mean?	42	58	58	42	.083
	Mean		*Mean*		
Type in three things that could happen to Earth, animals, plants or people because of climate change:	1.28		1.98		.000**
Write down three things that you can do to help prevent climate change:	1.95		2.10		.005**

*denotes significance at the 95% confidence interval
**denotes significance at the 99% confidence interval

Students' answers were significantly different before and after the intervention for five of the questions. More students correctly identified the main cause of climate change and what Earth would be like with no greenhouse gases. They were also able to, on average, list more effects of climate change and more climate-friendly actions after taking part in the project. However, fewer students correctly identified that Nitrogen is not a greenhouse gas. This indicates that while the project appears to have had an impact on students' cognitive domains, it is important to avoid introducing misconceptions.

Y5 control group

Question	**Before**		**After**		**p**
	% *correct*	% *incorrect*	% *correct*	% *incorrect*	
Which greenhouse gas is produced by burning fossil fuels?	49	52	47	53	.819
Which of these is a RENEWABLE energy source?	36	64	25	75	.225
What do scientists think is the main cause of climate change?	45	55	51	49	.532
How do trees affect global warming?	35	65	46	54	.394
Which of the following is NOT a greenhouse gas?	19	81	13	87	.317
What would Earth be like if there were no greenhouse gases at all in our atmosphere?	9	92	17	83	.248
Which releases the most greenhouse gases per person?	21	79	24	76	.763
What does 'carbon neutral' mean?	33	67	49	51	.074
	Mean		*Mean*		
Type in three things that could happen to Earth, animals, plants or people because of climate change:	1.26		1.52		.048*
Write down three things that you can do to help prevent climate change:	1.56		1.80		.067

*denotes significance at the 95% confidence interval
**denotes significance at the 99% confidence interval

In the control group, no statistically significant differences in knowledge were measured for the closed questions. However students were more likely to name more effects of climate change at the second stage than the first. This indicates that the CCSP did indeed have an impact on students' knowledge, as measured by this simple test.

4.1.2 Year 8 findings

Students were asked to respond to 10 questions in a 'climate quiz' at both stages of the survey. The questions were chosen to mirror those used for Year 5 students, although more of them were open response to make them more difficult for the older age group. Findings are presented in the table below:

Y8 schools

Question	Before		After	
	% *correct*	% *incorrect*	% *correct*	% *incorrect*
Which greenhouse gas is produced by burning fossil fuels?	41	32	74	21
What do scientists think is the main cause of climate change?	47	18	21	77
How do trees affect global warming?	44	32	85	15
What would Earth be like if there were no greenhouse gases at all in our atmosphere?	24	53	41	56
Which releases the most greenhouse gases per person?	9	77	29	62
What does 'carbon neutral' mean?	53	29	69	31
	Mean		*Mean*	
List three renewable energy sources:	1.04		2.28	
List three greenhouse gases:	1.00		1.63	
Type in three things that could happen to Earth, animals, plants or people because of climate change:	1.46		2.06	
Write down three things that you can do to help prevent climate change:	2.14		2.69	

NB percentages don't total 100% due to a large number of missing values, which are significant as possible indicators of students' lack of certainty in responding.

While the data set is too small to perform statistical tests, the descriptive results show some striking improvements in scores in many of the questions. In fact the improvements are much greater than for the Year 5 students.

The exception here is the question about the cause of climate change. Initially, many students left this blank. At the second stage, many students incorrectly answered 'global warming', which indicates a misconception between the causes and effects of climate change.

4.2 Affective impacts

Students were asked to respond to a number of statements that related to their attitudes and beliefs about climate change. Results are summarised in this section.

The abbreviations in the tables are:

SA Strongly agree
A Agree
NS Not sure
D Disagree
SD Strongly disagree

4.2.1 Year 5 findings

Y5 study sample

Statement	% Before					%After					p
	SA	*A*	*NS*	*D*	*SD*	*SA*	*A*	*NS*	*D*	SD	
Climate change is a risk to me	26	42	31	1	0	33	40	22	3	1	.374
I try to do everything I can to reduce my impact on climate change	29	32	28	6	6	32	38	20	8	2	.247
I look for information on climate change	19	40	23	16	2	33	25	18	13	10	.709
Climate change will harm other human beings	36	36	22	3	3	46	31	20	3	0	.085
Climate change will kill plants and animals	41	31	19	7	2	65	24	7	5	0	.001**
Climate change is not a danger to me	2	9	23	28	38	6	8	18	28	40	.801
I don't do anything to be climate friendly	2	7	24	28	39	6	8	23	20	43	.210
I've never noticed any information about climate change	9	20	17	30	25	5	10	11	33	42	.004**
Being climate friendly is something that other people do	13	31	43	7	6	28	35	29	6	1	.004**
I'd like to do more to be climate friendly, but I don't know what to do	20	29	28	13	10	16	30	34	10	10	.957
I'd like to do more to be climate friendly but there are things that stop me	4	26	26	28	15	24	28	24	14	11	.001**
People like me are climate friendly	24	30	38	6	2	28	29	26	14	3	.654
Climate change will be good for plants and animals	15	17	16	19	34	13	7	16	14	50	.121

*denotes significance at the 95% confidence interval
**denotes significance at the 99% confidence interval

There were significant differences in responses to four of the statements before and after the intervention. Students were more likely to accept the idea that climate change will kill plants and animals at the second stage. They were more likely to agree that 'I would like to do more to be climate friendly but there are things that stop me' afterwards, and were also more likely to reject the notion that 'I've never noticed any information about climate change' (unsurprisingly!)

Respondents were also more likely to agree that 'Being climate friendly is something that other people do'.

Y5 control group

Statement	% Before					%After					p
	SA	*A*	*NS*	*D*	*SD*	*SA*	*A*	*NS*	*D*	SD	
Climate change is a risk to me	30	28	35	4	2	27	42	29	0	2	.513
I try to do everything I can to reduce my impact on climate change	21	39	30	11	0	26	30	28	17	0	.545
I look for information on climate change	18	21	18	27	16	15	19	17	27	23	.281
Climate change will harm other human beings	43	23	21	7	7	37	37	22	2	2	.219
Climate change will kill plants and animals	59	32	0	7	2	64	23	11	0	2	.584
Climate change is not a danger to me	11	9	16	21	43	9	13	28	17	34	.306
I don't do anything to be climate friendly	10	10	29	27	24	2	18	27	33	20	.413
I've never noticed any information about climate change	13	18	31	27	11	17	21	21	21	21	.766
Being climate friendly is something that other people do	23	27	39	9	2	25	25	44	2	4	.634
I'd like to do more to be climate friendly, but I don't know what to do	33	36	20	9	2	25	31	21	15	8	.176
I'd like to do more to be climate friendly but there are things that stop me	16	20	38	16	11	21	30	28	15	6	.181
People like me are climate friendly	14	33	41	7	5	25	30	36	8	2	.152
Climate change will be good for plants and animals	25	11	5	14	46	19	17	15	13	36	.971

*denotes significance at the 95% confidence interval
**denotes significance at the 99% confidence interval

There were no significant trends in the data for the control group, which indicates that the shifts for the study group were related to the CCSP interventions.

4.2.2 Year 8 findings

Students in Year 8 were asked to respond to the same set of attitudinal statements as the younger students. Here are the results.

Y8 sample

Statement	% Before					% After				
	SA	*A*	*NS*	*D*	*SD*	*SA*	*A*	*NS*	*D*	SD
Climate change is a risk to me	21	48	28	3	0	19	66	13	3	0
I try to do everything I can to reduce my impact on climate change	14	35	41	7	3	0	28	66	13	0
I look for information on climate change	4	21	43	14	18	0	16	19	41	25
Climate change will harm other human beings	28	45	28	0	0	34	53	9	0	3
Climate change will kill plants and animals	48	30	19	4	0	38	50	13	0	0
Climate change is not a danger to me	7	4	33	19	37	9	6	19	44	22
I don't do anything to be climate friendly	4	4	36	50	7	6	16	41	22	16
I've never noticed any information about climate change	4	18	32	25	21	3	16	42	32	7
Being climate friendly is something that other people do	22	41	30	4	4	6	47	31	9	6
I'd like to do more to be climate friendly, but I don't know what to do	3	35	55	3	3	13	28	38	22	0
I'd like to do more to be climate friendly but there are things that stop me	7	14	46	29	4	9	21	38	28	3
People like me are climate friendly	7	21	52	14	3	3	32	58	3	3
Climate change will be good for plants and animals	3	14	45	10	28	13	25	16	22	25

Descriptively, more students agreed or agreed strongly that 'climate change is a risk to me' and that 'climate change will harm other human beings'. It also appears that students became more polarised about the idea 'I don't do anything to be climate friendly', and less polarised, or less sure, about the idea that 'I try to do everything I can to reduce my impact on climate change'.

4.3 Climate-related behaviours

Students were asked about climate-related behaviours in three ways. Firstly they were asked about their own actions, secondly they were asked whether they would like to do each action more or less, and thirdly they were asked if they encourage others to act.

Findings are summarised in this section.

The abbreviations in the tables are:

AT All the time
O Often
S Sometimes
HE Hardly ever
N Never

4.3.1 Year 5 findings

Y5 study group

How often do you…	% Before					%After					p
	AT	*O*	*S*	*HE*	*N*	*AT*	*O*	*S*	*HE*	*N*	
Grow your own food	11	19	27	18	25	16	34	14	10	26	.000**
Switch off the tap when cleaning your teeth	64	17	11	3	5	66	14	8	4	8	.760
Unplug chargers, don't leave TV on standby etc.	43	21	18	9	9	53	20	18	1	8	.068
Walk, cycle or get the bus instead of asking for a lift in the car	44	16	20	10	10	38	21	23	8	10	.722
Use reusable carrier bags	56	23	14	2	6	56	20	14	7	3	.930
Make compost from food waste	17	11	18	15	39	19	11	20	15	35	.281
Recycle glass, plastic, paper etc.	66	16	15	0	3	68	16	9	1	6	.987
Find out about climate change from TV, books or talking to people	22	23	28	9	18	26	21	23	17	13	.634

Would you like to do this more or less often?	% Before			%After			p
	More	*Same*	*Less*	*More*	*Same*	*Less*	
Grow your own food	72	20	8	9	2	5	.351
Switch off the tap when cleaning your teeth	55	44	1	49	46	6	.064
Unplug chargers, don't leave TV on standby etc.	61	28	12	61	32	7	.651
Walk, cycle or get the bus instead of asking for a lift in the car	56	38	6	63	28	9	.776
Use reusable carrier bags	68	30	2	8	3	6	.114
Make compost from food waste	47	35	19	49	40	12	.350
Recycle glass, plastic, paper etc.	9	38	4	63	33	5	.627
Find out about climate change from TV, books or talking to people	67	28	5	51	38	11	.029*

How often do you encourage others to…	% Before					%After					p
	AT	*O*	*S*	*HE*	*N*	*AT*	*O*	*S*	*HE*	*N*	
Buy locally grown fruit and vegetables when they are in season	30	22	30	11	8	30	28	26	10	7	.529
Grow their own food	24	30	20	9	17	30	27	21	8	14	.137
Think about how much packaging there is when buying food	29	22	23	18	8	32	22	26	11	9	.370
Think about whether something is or can be recycled when buying products	35	29	20	8	9	29	38	16	7	10	.985
Switch off the tap when cleaning their teeth	55	24	12	5	5	61	18	10	7	5	.910
Unplug chargers, don't leave TV on standby etc.	51	21	15	7	6	58	17	17	2	6	.515
Walk, cycle or get the bus instead of using the car	47	21	22	5	6	46	21	19	6	8	.702
Share car journeys	33	20	30	5	13	38	23	21	5	15	.701
Avoid travelling by plane	22	11	25	14	29	31	18	17	10	24	.033*
Use reusable carrier bags	56	17	12	5	7	55	14	20	8	3	.342
Make compost from food waste	16	18	16	12	39	23	22	14	14	28	.025*
Recycle glass, plastic, paper etc.	55	18	16	8	4	63	12	15	5	6	.772
Find out about climate change from TV, books or talking to people	29	15	20	17	19	37	11	20	11	22	.638

*denotes significance at the 95% confidence interval
**denotes significance at the 99% confidence interval

Students said they were more likely to grow their own food at the second stage than at the first stage. However this could relate to the fact that the first survey was distributed during winter and the second during spring/summer… They said they were finding out about climate change less often, which can perhaps be explained by the fact that they are getting information from school. Students were more likely to encourage others to avoid travelling by plane and make compost from food waste after taking part in the project.

Y5 control

Statement	% Before					%After					p
	AT	*O*	*S*	*HE*	*N*	*AT*	*O*	*S*	*HE*	*N*	
Grow your own food	11	15	20	13	41	21	8	25	13	33	.316
Switch off the tap when cleaning your teeth	76	9	9	0	7	50	25	10	6	8	.050*
Unplug chargers, don't leave TV on standby etc.	47	24	20	2	7	50	10	23	10	6	.762
Walk, cycle or get the bus instead of asking for a lift in the car	52	15	22	7	4	46	19	21	8	6	.481
Use reusable carrier bags	50	25	7	11	7	52	27	15	6	0	.318
Make compost from food waste	21	5	11	7	57	28	9	9	9	47	.184
Recycle glass, plastic, paper etc.	58	4	18	7	13	55	13	21	6	4	.268

Find out about climate change from TV, books or talking to people	21	18	21	16	25	27	10	17	15	31	.849
Would you like to do this more or less often?	**% Before**			**%After**			**p**				
	More	*Same*	*Less*	*More*	*Same*	*Less*					
Grow your own food	57	26	17	61	30	9	.243				
Switch off the tap when cleaning your teeth	58	37	4	54	44	2	.808				
Unplug chargers, don't leave TV on standby etc.	62	29	9	55	41	5	.653				
Walk, cycle or get the bus instead of asking for a lift in the car	58	36	7	52	46	2	.827				
Use reusable carrier bags	61	30	9	59	34	7	.906				
Make compost from food waste	39	30	32	50	25	25	.046*				
Recycle glass, plastic, paper etc.	59	28	13	65	24	11	.696				
Find out about climate change from TV, books or talking to people	58	24	18	43	36	21	.441				
How often do you encourage others to…	**% Before**					**%After**					**P**
	AT	*O*	*S*	*HE*	*N*	*AT*	*O*	*S*	*HE*	*N*	
Buy locally grown fruit and vegetables when they are in season	37	30	17	7	9	23	30	28	13	6	.183
Grow their own food	27	14	16	16	27	19	28	26	19	9	.129
Think about how much packaging there is when buying food	30	18	30	4	17	28	22	22	26	4	.886
Think about whether something is or can be recycled when buying products	35	22	17	11	15	39	23	21	13	4	.246
Switch off the tap when cleaning their teeth	67	16	9	4	4	47	15	23	9	6	.030*
Unplug chargers, don't leave TV on standby etc.	63	13	22	0	2	45	13	19	17	6	.011*
Walk, cycle or get the bus instead of using the car	44	13	27	4	11	44	22	13	11	9	.079
Share car journeys	30	22	22	11	15	22	24	24	9	22	.412
Avoid travelling by plane	21	14	11	21	34	28	13	21	19	19	.151
Use reusable carrier bags	55	16	16	11	2	43	19	23	13	2	.408
Make compost from food waste	21	5	16	16	43	20	20	22	11	28	.065
Recycle glass, plastic, paper etc.	58	13	22	2	4	40	20	22	13	4	.047*
Find out about climate change from TV, books or talking to people	28	13	26	11	22	27	16	20	20	18	.917

*denotes significance at the 95% confidence interval
**denotes significance at the 99% confidence interval

Students in the control group said they were *less* likely to switch off the tap when they were brushing their teeth at the second stage than at the first. However, they were more likely to say they wanted to make compost from food waste more often at the second stage.

Interestingly, there are three significant correlations in the data set relating to encouraging others to be climate friendly. Year 5 students said they encouraged others to 'switch off the tap when cleaning their teeth', 'unplug chargers, don't leave TV on standby' and 'recycle glass, paper, plastic etc.' less often at the second stage than at the first. The survey does not identify the reasons for the changes in the reported behaviours here.

This could indicate that as students get older they become more apathetic towards the environment, although it would be unwise to draw strong conclusions from the relatively small data set.

4.3.2 Year 8 findings

Y8 sample

Statement	**% Before**					**%After**				
	AT	*O*	*S*	*HE*	*N*	*AT*	*O*	*S*	*HE*	*N*
Grow your own food	8	12	12	44	24	3	10	26	26	36
Switch off the tap when cleaning your teeth	37	33	11	7	11	29	16	23	16	16
Unplug chargers, don't leave TV on standby etc.	39	23	19	8	12	16	32	36	10	7
Walk, cycle or get the bus instead of asking for a lift in the car	41	37	19	4	0	36	23	32	7	3
Use reusable carrier bags	27	35	19	16	4	23	16	39	16	7
Make compost from food waste	11	19	19	15	37	10	10	13	26	42
Recycle glass, plastic, paper etc.	50	19	19	11	0	39	33	19	7	3
Find out about climate change from TV, books or talking to people	8	20	28	28	16	10	3	39	19	29

Would you like to do this more or less often?	**% Before**			**%After**		
	More	*Same*	*Less*	*More*	*Same*	*Less*
Grow your own food	57	35	9	39	58	3
Switch off the tap when cleaning your teeth	56	36	4	48	52	0
Unplug chargers, don't leave TV on standby etc.	44	40	8	52	48	0
Walk, cycle or get the bus instead of asking for a lift in the car	44	48	4	47	50	3
Use reusable carrier bags	52	44	4	42	58	0
Make compost from food waste	48	24	24	33	57	10
Recycle glass, plastic, paper etc.	48	44	4	50	40	10
Find out about climate change from TV, books or talking to people	40	36	16	39	52	10

How often do you encourage others to…	% Before					%After				
	AT	*O*	*S*	*HE*	*N*	*AT*	*O*	*S*	*HE*	*N*
Buy locally grown fruit and vegetables when they are in season	28	16	36	8	12	23	42	23	3	10
Grow their own food	12	16	40	16	16	16	23	29	16	16
Think about how much packaging there is when buying food	4	17	38	17	25	7	23	37	10	23
Think about whether something is or can be recycled when buying products	13	17	46	13	13	13	26	29	16	16
Switch off the tap when cleaning their teeth	12	24	32	12	20	19	33	33	10	7
Unplug chargers, don't leave TV on standby etc.	22	26	30	13	9	29	26	33	0	13
Walk, cycle or get the bus instead of using the car	26	22	35	9	9	26	23	36	13	3
Share car journeys	26	13	35	17	9	29	29	23	13	7
Avoid travelling by plane	13	9	30	26	22	10	19	23	23	26
Use reusable carrier bags	5	27	46	9	14	19	26	36	13	7
Make compost from food waste	14	0	36	27	23	10	13	33	16	29
Recycle glass, plastic, paper etc.	26	22	30	4	17	26	23	26	13	3
Find out about climate change from TV, books or talking to people	4	13	30	26	26	10	17	30	23	20

The Year 8 trends are interesting. Most students said they did the various actions less often at the second stage than the first (the possible exception to the trend is recycling glass, paper, plastic etc.). At the second stage more students said they were happy with how often they did the actions (again apart from the recycling example). This is despite the fact that earlier in the year, more students said they would like to do the actions more often.

Combined, these findings appear to indicate that earlier in Year 8 students were more likely to act in a climate-friendly way and also want to do more climate friendly actions. Later in the year the frequency of the actions appears to have been reduced, and students are happier with the reduced frequency.

However the findings for encouraging the actions of others oppose the trend. Students were more likely to encourage others to do almost all the climate friendly behaviours listed at the second stage compared to the first.

However there were a large number of missing responses in the first stage survey, typically only 24 of the sample of 34 answered at the first stage, while over 30 answered at the second stage. With such a small sample, this is likely to have skewed the results.

4.4 Comparison between study and control samples

When selecting the study and control schools, we were concerned that the schools participating in the project might be more likely to foster positive attitudes towards climate change, as this might motivate them to participate in the project in the first place. To control for this where possible, control schools were recommended by the Local Authority to match demographics as closely as possible. Two schools that contributed to the control data set are also planning to come on board with CCSP following the pilot year.

Using the Mann-Whitney U test, we tested the responses of the students in the study and control group for differences in their pre-existing knowledge, attitudes and behaviours related to climate change and found only a few significant differences:

- Students in the study sample were more likely to agree they looked for information on climate change and that they grow their own food;
- Students in the control group were more likely to agree that they don't do anything to be climate friendly and that they'd like to do more to be climate friendly, but they don't know what to do.

These findings mildly support the idea that the study schools were more switched on about climate change, but there does not appear to be a dramatic difference.

4.5 Comparison between males and females

The attitudes of males and females were compared at the 'before' stage of the survey. In addition, a new variable was computed by subtracting the 'before' responses from the 'after' responses, and the differences in shifts between males and females was explored.

For all students at the pre-stage:

- Males were more likely to agree that 'climate change is a risk to me'
- Females were more likely to agree that 'climate change will kill plants and animals'

For the study group:

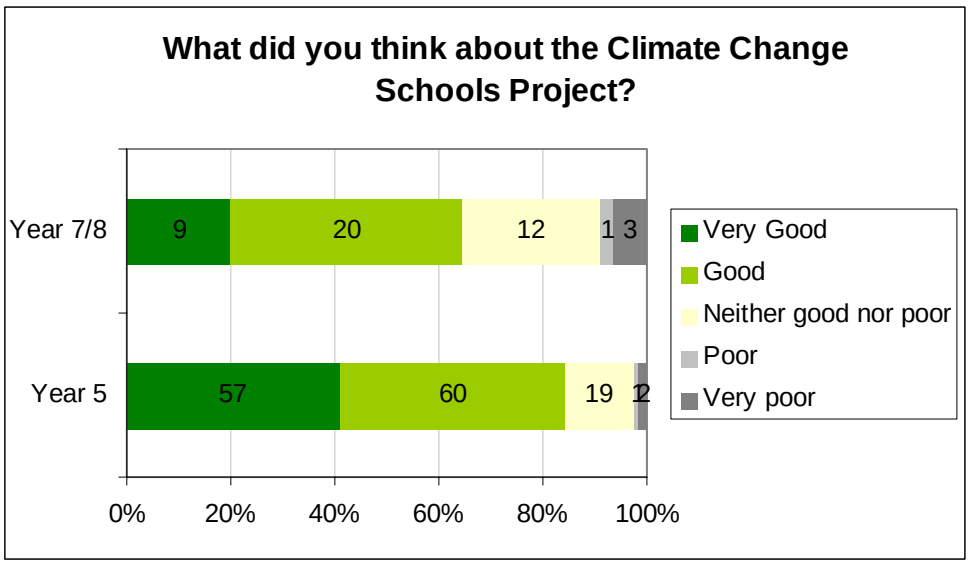
- Females were more likely to report increasing the frequency that they grow their own food and unplug chargers etc. indicating that these impacts were slightly stronger for females than males.

5 Project evaluation

All students that participated in activities were asked some questions about the project itself. This section summarises the findings of that part of the evaluation.

5.1 Overall impressions

The survey initially explained that by 'Climate Change Schools Project' we were referring to all the activities they had been doing at school this year that related to climate change; partly because students might not recognise the name of the project but also because many Lead Schools used their new role as a catalyst to become involved in other climate change initiatives and activities. Students were then asked to rate the activities overall, and to pick out their favourite and least favourite activities, giving the reasons for heir choices.



Two-thirds of Year 7/8 students (64%) and 84% of Year 5 students rated the activities as either 'good' or 'very good'.

5.2 Most interesting activity/topic

Year 5 students cited a range of topics and activities as the most interesting. These were:

- Posters (11)
- Comics (9)
- Wind farm/renewables (9)
- Fossils (8)
- Coral reef powerpoint (8)
- Animals (8)
- Plants and forests (7)
- Ozone rap (6)
- ICT search (4)
- Non-CCSP: Climate connections (4)
- Animations (3)
- Non-CCSP: LEGO (3)
- How to make a change (3)
- Other (8)
- General comment (36)

Here are the results for Year 7 and 8 students:

- Making climate change models (7)
- Photo story (6)
- All good / don't know (4)
- Icebergs (3)
- All boring (3)
- Other activity (10)

Highlighted activities were not recognised as part of the Lead Schools package.

5.3 Least interesting activity/topic

Students were also asked to state which activity or topic they found least interesting. Year 5 students gave the following responses:

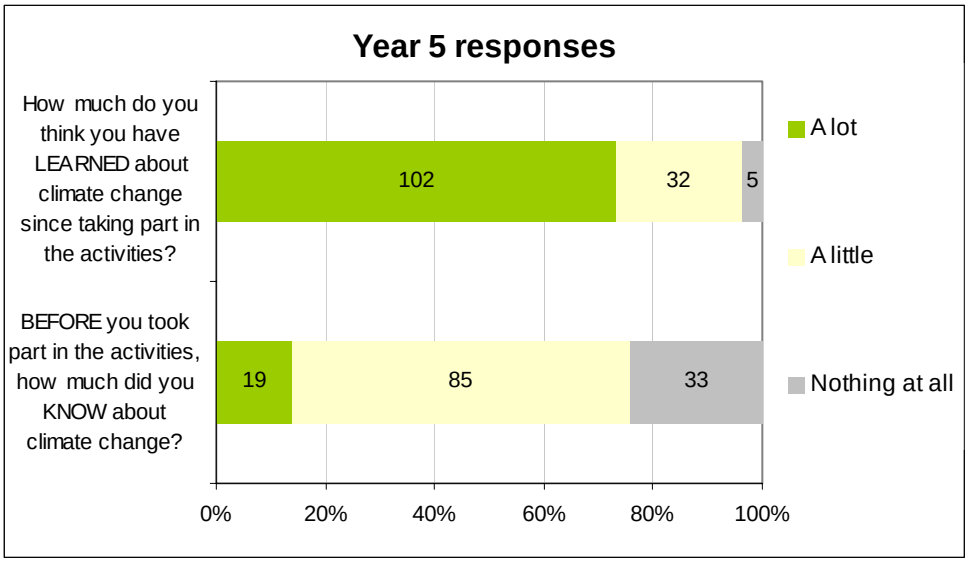
- Nothing / don't know (64)
- Learning about climate change generally (11)
- Gases (9)
- Wind turbine (4)
- Demonstration of the earth with an orange (4)
- KWL grid (3)
- Writing (3)
- Slide shows (3)
- Other (17)

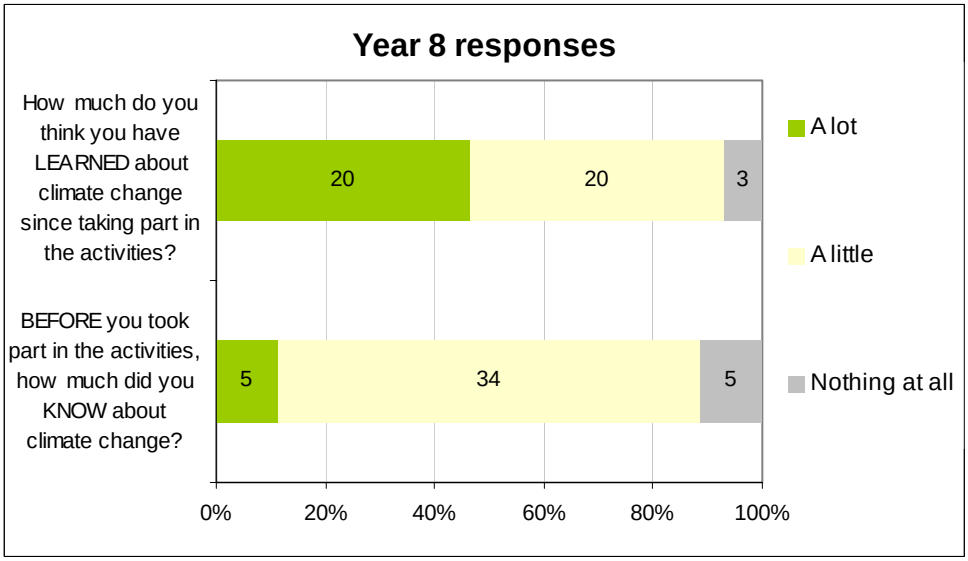
Year 7 and 8 students' responses were:

- Don't know (11)
- All boring (4)
- Videos (3)
- Writing (3)

- Discussions (3)
- Other (5)

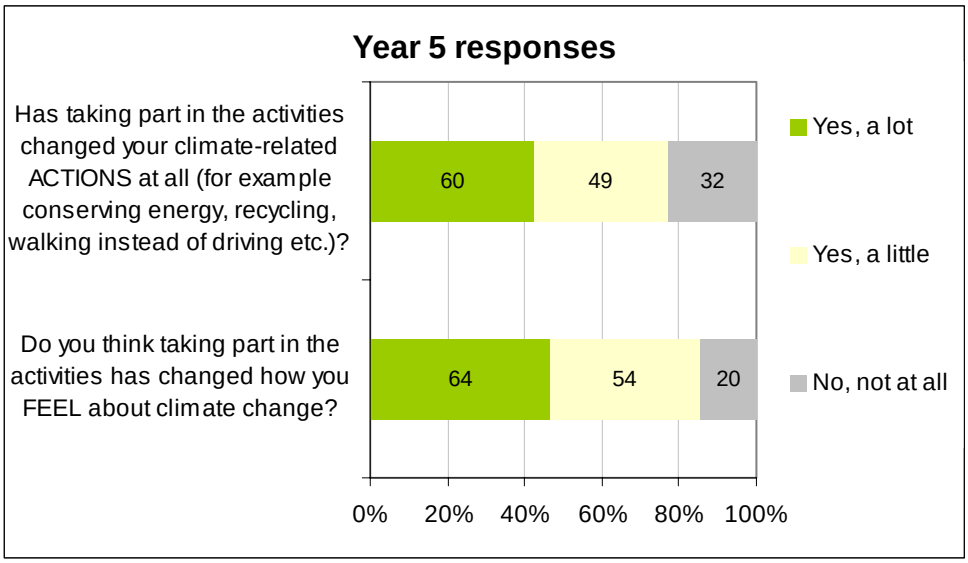
5.4 Impacts on knowledge

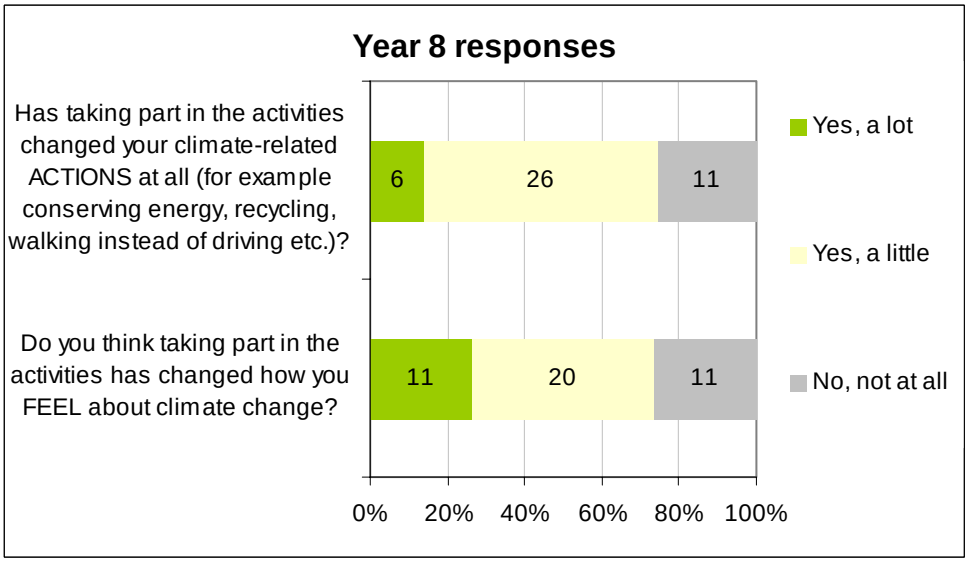




Year 5 students were more likely to say that they knew nothing about climate change before the project than Year 8 students, a finding which was reinforced in the focus group discussions (reported in the next section). Year 5 students also reported learning more from the activities.

5.5 Impacts on attitudes and behaviour





Year 5 students were more likely to report impacts on their attitudes and behaviours than Year 8 students. This reinforces the findings from the before and after surveys.

If students answered 'yes' to changes in attitudes and behaviours, they were asked to describe the changes. The responses were grouped into categories and are presented in the table below:

Category	Year 5 responses	Year 8 responses
Action: a desire to do more or examples of actions already taken	33	13
Concern: expressions of worry or concern	13	1
Empathy: empathy with animals/people/environment or general sadness	12	5
Awareness: increased knowledge or awareness of effects	11	4
Happy: expressed feeling more happy or relaxed	2	0
General: nonspecific expression of a change in feelings	18	1
No change: expression that feelings hadn't changed	7	2

The most common category was 'action' where students said the activities had encouraged them to be more climate friendly, or have a more positive attitude towards climate friendly behaviours. This indicates that students felt empowered to act by learning about climate change. Example quotes from this category are:

I have got more cautious about the way I react to climate change. I feel strongly about climate change now and I am going to do more for the environment! (Year 5)

Because it has made me see how I need to treat the earth (Year 5)

I now try to recycle more and walk instead of going in the car. (Year 5)

I don't leave things on standby (Year 8)

I think people should do more. (Year 8)

However for some students, especially younger ones, the activities raised fears and concerns about the future of the world:

I'm worrying a lot (Year 5)

I feel it's really scary what is happening right now. (Year 5)

It's made me a bit more cautious about what I do. I'm worried that the world will flood. (Year 5)

Although two Year 5 students said they felt happier or more relaxed. Many students said they 'care' more, or expressed empathy for people, animals or the world in general:

Because it has told me how much of a threat it is to animals and the world (Year 5)

Because I care a bit more about it (Year 8)

They have changed my feelings by making me angry about how we mistreat the environment (Year 8)

Some students also linked a change in attitude with their increased knowledge about climate change:

I understand more about the earth and how we are affecting it by using cars more than cycling. (Year 5)

Knowing what the effects are. (Year 8)

Students who said they had changed their actions were also asked to describe how. Again results were categorised. If students listed more than one action, each action listed was categorised separately. A number of students listed two or three actions. However for some responses it was unclear whether these were actions they already did, or had taken up as a result of learning about the effects of climate change.

Category	Year 5 responses	Year 8 responses
Transport: walking, cycling, using car less etc.	28	7
Recycling	22	8
Saving electricity	20	7
Reusing paper, plastic bags etc	4	1
Growing plants/food	2	1
Saving water	2	0
Composting	0	1
Changed attitude	10	0
Change, but not specified	12	2
No change	6	2

The most popular behaviours were walking/cycling, recycling and saving electricity. Some younger students appeared to misunderstand the question, and expressed how hey feel about climate change. Others said they had changed their behaviour, but could not or did not explain how.

I have started walking to more places it keeps you healthy and is good for the environment (Year 5)

I like to walk to school now instead of bagging a lift in the car. (Year 5)

Well my family agreed that I should walk half way to school because I live quiet far from school (Year 5)

I am turning off electrical sockets of (tellys, sockets and computers) (Year 5)

When we get plastic bags from shops we take them to other shops to use and use them for putting rubbish in. (Year 5)

I recycle a little bit now (Year 8)

At home, we grow our own food (Year 8)

Students were also asked if there were any other impacts. Some used the space to describe knowledge, feelings or actions, but there were some other interesting comments, all from Year 5 students:

Encouraging others

I have talked to people about it and said what I do and convinced them to do it too which to be honest I'd never have done before!

I joined the eco committee

They let me know how other people dealt with Climate Change

They made me more passionate about climate change

5.6 Improving the project

Students were asked if they had any suggestions for improving the project. Some said the activities were already very good and could not be improved. Some said the activities could be 'more fun' or 'more exciting'. Both of the year groups also suggested running the activities for longer, which is a helpful implication for advising the Lead Schools teachers. However there were some more specific suggestions.

From Year 5 students:

- Some more quizzes and games
- More filming or drama work
- Including some trips out of school
- Asking students how they feel

From Year 8 students:

- More practicals
- No book work
- More trips out of school
- More ICT
- More/bigger whole class projects

Obviously not all the students' suggestions will be practical, but they may give some ideas for future planning.

6 Focus group findings

Three focus groups were conducted in February 2009, and three more were conducted in May 2009. Four involved Year 5 students, one involved Year 7 students and one involved Year 8 students.

The focus groups started with an introduction and explanation of ground rules, then asked students to list activities they had been involved in. This led to a ranking exercise, where students placed the activities on a scale according to how enjoyable they were. When a consensus had been reached, the ranking was repeated according to how educational students felt the activities were. The final section of the focus group explored impacts on knowledge, attitudes and behaviour. For a copy of the focus group schedule, see the Appendix.

Between 5 and 7 students participated in each of the discussions.

6.1 Opinions about the activities

Students that participated in the later focus groups had time to cover more material than those that participated in the earlier sessions. The first round of focus groups was conducted in February to coincide with the project's interim report deadline in March. However the approach was interesting to explore students' attitudes at different stages of the project.

The feedback from the ranking exercises is presented in the tables below. The activities that were part of the Lead Schools Modules are highlighted in green below. One activity was a 'linked' activity, which was recommended by the programme but is also delivered to other schools, and is highlighted in yellow.

The other activities were identified by students as being related to climate change, although they may not be part of the CCSP programme. For the Year 7 group, a facilitator's prompt about practicals could have stimulated the students to come up with practical activities generally, rather than those specific to climate change topics.

February focus groups

Rankings	Year 5 (1)	Year 5 (2)	Year 7
Most enjoyable	Comic strip	Making windmills	Poster project Acid practical
	Posters, Plants and animals	Climate cops, Recycling, Bottle garden, Calendar competition	Endangered species, Grit practical Pollution DVD
		Weather, Wind farms, Holiday weather	Energy DVD, Carbon DVD
	Finding information, temperatures	Evaluation, Ozone layer	
		Polar bears/ice caps/extinction	Liquid practical Computer research Discussing opinions Text book activity
Least enjoyable		Research	Icebergs
	E-survey		

May focus groups

Rankings	Year 5 (1)	Year 5 (2)	Year 8
Most enjoyable	Making posters/ Comic strips/ Fashion show/ Making fossils/ Ozone rap Experiment with water temperature	Water experiment demonstration / Powerpoint about coal-fired power stations / Internet research about greenhouse gases / Wind farm video, discussion and vote	Holiday Brochure / Photo Story Inconvenient Truth
	Orange peel/ozone layer demonstration/ Map of the world	Coral reef	Balloon model / Discussion
			Footprint Friends website
Least enjoyable	Research into coral reefs	Recycling magician / Reading and writing about climate change	
		Evaluation survey	

February focus groups

Rankings	Year 5 (1)	Year 5 (2)	Year 7
Most educational	Finding information	Making windmills, Climate cops	Discussing opinions
			Grit practical
	Temperatures, Plants and animals	Research Ozone layer Holiday weather	Carbon DVD Pollution DVD, Text book activity
		Recycling, Wind farms, Bottle garden Weather	Acid practical
	Posters, Comic strip, E-survey		Liquid practical, Computer research, Poster project, Energy DVD
		Polar bears/ice caps/extinction, calendar competition	
Least educational		Evaluation	Endangered species Icebergs

May focus groups

Rankings	Year 5 (1)	Year 5 (2)	Year 8
Most educational	Ozone rap/ coral reef research / Making fossils/ Fashion show	Wind farm video, discussion and vote / Water experiment demonstration	Inconvenient Truth
		Coral reef	Photo Story
			Balloon Model
		Powerpoint about coal-fired power stations	
	Orange peel demonstration	Internet research about greenhouse gases	
			Footprint Friends / Discussion / Holiday Brochure
Least educational	Map of the world/ Comic strips	Reading and writing about climate change / Recycling magician	
		Evaluation survey	

Students were very clear about which activities they enjoyed the most.
They enjoyed those that were interactive, creative, practical and self directed.

> *"I thought it was quite fun because we go to cut out food and waste from newspaper and made a big waste pile to show people" (Year 5)*

> *"The acid practical, because we were working in groups and we got to choose which groups, and it was fun to do" (Year 7)*

"In the grit practical we were actually doing stuff and like being messy and stuff and we could mess around" (Year 7)

"I like working in groups because when you have a really hard question, and somebody is really good at the Earth thing and knowing what it is, you can just ask them, and then you could get it right." (Year 5)

Students valued the opportunity to be creative. Activities which allowed them to demonstrate their knowledge through creative means were felt to be particularly enjoyable and informative, for example the ozone rap, photo story and the fashion show.

"I thought I learnt a lot from the rap because like you got – you did research and you put it in a sentence and like you put it into a rap and you put it into a poem like and then back into a rap and you did it with your friends and that and then you got to add more to it and me and [classmate] did like the school assembly." (Year 5 girl)

However, some students quickly tired of activities that were more heavily biased to the creative skill rather than the climate change content, or if they were unable to do the content research for the creative activity.

Compare the focussed activity of the rap to the experiences of Year 5 students who were simply asked to do some research on the internet:

"I sort of liked it but I learnt not a lot from it because we just went on the computer and just found little bits of information about things, what we wanted to know and they got muddled up with things that had nought to do with it." (Year 5)

Similarly, when students were invited to create something but were not given time to do the necessary research they felt the activity had less educational value:

"That one I didn't learn anything off, the leaflet because we had to write it down and it didn't come with any information, we had to make it up off the top of our heads." (Year 8 Male)

Again, the issue about duration of activities is something which may be highlighted to the Lead Schools teachers to enable students to get more out of the sessions.

One way to make activities interactive is to use a group work approach, which many of the activities adopted. Some Year 5 students had an interesting conversation about the advantages and disadvantages of group work:

Facilitator: Do you like working in groups?

Child 2: Sometimes if it was too much, it doesn't get done right Sometimes, I wound up doing something on my own because I get more work done than being in groups.

Girl: I always like being in groups because I get put off... I mean, I don't like doing it all myself.

Boy 1: Yeah. I like going in groups, but sometimes if there are too many people in the group you just don't get on, and you just have to... like...

Girl: Fight

Students in the Year 7 group also had differing opinions on whether they preferred a social approach to learning:

"I think it was a good bit of learning because we learned more because we had opinions, but we would think what we think and be educating them. But then everyone else started talking and we found education from them as well. The question for them might be a bit more burning, as well." (Year 7)

"Because I thought we learned on our own. Like sometimes the class has to all take part but this time we did it by ourselves. And we got to do what we thought for ourselves. So I thought it was like next to the discussion one, because it was really we could work by ourselves and it was quite interesting, because some people might be working and then going on." (Year 7)

Students in Year 8 enjoyed the opportunity to work in groups but it affected their enjoyment and the perceived educational value of the activities.

Year 8 boy: I was neutral about it.

Facilitator: Ok do you want to tell me why?

Year 8 boy: Because we only had like a little bit of time to do it and we were working in groups and they were putting anyone in the groups, so I got put in with mostly boys.

Facilitator: Ok, so it was to do with the people you were working with and how much time you'd got to do it. Would you have enjoyed it more if it had been with…

Year 8 boy: Me friends?

Facilitator: With your friends.

Year 8 boy: Yeah.

Facilitator: What about the others? Did you enjoy it?

Year 8: Yeah I ended up doing all the work because the other two people that I was working with didn't really have a clue.

Students in one of the Year 5 groups were more complimentary about group work when they had clearly defined roles:

Year 5 boy: Well, one person in your group did one thing and the other person – because one would do a poster and the other would do a powerpoint and someone would either do some of the research and help both of the people or just do their own.

It was clear that the students had all experienced opportunities to view each others' work and to listen to each others' opinions. However, students had mixed opinions about this. They were less keen to listen to each other when they felt they were simply expressing opinions. When they could see the results of each others work they found it useful as it acted as a benchmark against which they could measure their own performance.

"It was quite good like because then like about a week after they put them [photostories] all up on the computer so we watched everyone's." (Year 8)

The students who had watched films as part of their teaching had clearly learnt a lot from the experience. This could be because of the novelty of watching films in class. However the strong visual element clearly had an impact on the Year 8 group:

Year 8: That had the most impact because it had loads of images.

Year 8: Visual

Year 8: It got a bit stuck in your mind because it kept repeating things. It was really good because when it started off with the music and stuff, it got you right into it, like an action film. It was really good for me, like everyone listening and getting involved and the way he was speaking and stuff just made you go like wow.

The value of movies in helping some students visualise some of the impacts of climate change was also highlighted in one of the discussions with younger students:

Year 5 girl: I like the DVDs, I like movies

Facilitator: But did they help you learn?

Year 5 boy: No

Year 5 girl: But it was showing you all across the world, and it showed you that…

Year 5 boy: It was just showing on the videos how much CO_2 is produced. Because every time there was movement there was coming out CO_2.

However, one Year 5 group that had watched a video had clearly come away from the experience with some inaccurate information:

Year 5: We watched a video on like lots of different topics, like how the world could end in 2012, like so we done all those topics in one video.

Facilitator: Ok. Was there a name for that video?

Year 5: It was just on YouTube.

This assertion of the world ending imminently was not unique to this participant or to this group:

Facilitator: Ok so the lessons were quite exciting. So how do you feel now about climate change? And what I'm thinking about here is not about how you feel about the lessons but how you feel about climate change itself.

Year 5: I don't want the world to melt.

Facilitator: You don't want the world to melt?

[Participants speaking at once]

Year 5: I read something on the internet about how the ice caps will be fully melted by 2013 so it's a bit scary.

Later in the session the students again asserted that what they had taken from the lessons was that the world was going to end in the next few years.

Facilitator: Ok, so Year 5 boy 1 and Year 5 boy 2, Year 5 boy 1 you were saying that you didn't know anything about climate change at all, but now you feel like you know quite a lot? So what sort of things do you know now about climate change?

Year 5 boy 1: Well –

Facilitator: This isn't a test by the way.

Year 5 boy 1: Well I know stuff about climate change, because I wrote it down and I know (…) the world's going to end in 2012.

These video clips were **not** part of the provided Lead Schools Module activities, and reflects the project's encouragement for teachers to adapt/enhance the Modules for their students. However, it is crucial for teachers to be encouraged to be more discerning about what materials they do add to the Lead Schools activities or how they deliver other additional resources to help avoid miscommunication to students.

The year 8 group were not as insistent on the date of the end of the world, but they were clear that climate change was going to happen regardless of the behavioural changes they undertook. However, they did not feel they had the knowledge to cope with environmental change. This is discussed in greater detail later in this report.

Some of the activities were universally disliked. One school brought in a 'recycling magician', in addition to the materials provided by the project. Unfortunately this was not well received by students, who said he was boring, talked too much and wasn't very good at magic. Again, it is worth emphasising to Lead Schools teachers that they must be discerning

about the sort of material they 'add in' to their suggested climate change activity through the Modules.

In the Year 8 group the students similarly rounded on the Footprint Friends website. This was for a variety of reasons: they felt it was childish, they had to pay to access the games, they couldn't necessarily access it from home and because they couldn't link it to other activities such as the photo story. The point about paying to access the games was interesting, as this is not actually the case. It could be that this misconception fed these students' dislike of the website.

> *Year 8: Footprint Friends didn't learn me much because it was for young people who was (…) and it was just like stuff I already knew.*
>
> *…*
>
> *Year 8: And it wasn't fair for people at home who didn't have computers and stuff and the internet.*

Students were able to articulate the tension between activities that were enjoyable and those that had the greatest educational value. They found that some activities were fun, but didn't have as much educational value as others:

> *"Even though we learned stuff, we only had a bit of information. We were like colouring in the rest. I think that was probably the best in a fun way. But I don't think like we didn't get hardly any information. So like we weren't learning hardly anything, we were just sort of colouring in." (Year 5)*

However others felt that a fun activity would make new information more memorable:

> *"Sometimes if its fun it gets through to you, but then when it's really hard you just don't understand it and you don't pick it up. I think we should have done the comic strip because it was fun. And like, we didn't learn much from it, but the things we did learn, they got through to us" (Year 5)*

Overall, the students all expressed interest and engagement when learning about climate change.

> *"I didn't really care, I thought it was going to be really, really boring at first and then I found out that I enjoyed it a lot and a lot of the lessons that we did they were quite exciting." (Year 5 girl)*

In most of the groups, there were differences of opinion between students that had enjoyed or learned more from different types of activity, including group and individual work, discussions, videos, bookwork and practicals. This indicates that the general good practice of including a mix of different activities was effective.

However, it was not simply the mix of activities that was engaging, it was the opportunity to work in a cross-disciplinary manner which was particularly well summed up by this Year 5 student:

> *"I get a bit bored of always doing maths, literature and science and the usual, but once we started doing climate change it got really interesting because like it was all of them put together" (Year 5)*

6.2 Climate change knowledge

Overall, Year 5 students did not know much or anything about climate change prior to the modules, although most had heard the phrase before and related it to the planet or recycling. The examples below come from two of the Year 5 focus groups:

> *Facilitator: Tell me how much you knew about climate change before you started doing this?*

Year 5: Nothing.

Year 5: Before I came to this school, I did it because I came in in like year four or something and like before that I did a little bit of climate change in my other school.

Facilitator: Ok, so you'd already done a little bit in another school but everyone else here hadn't done anything else.

Year 5: No, me and [classmate] are the only ones here who have been at other schools since reception.

…

Facilitator: I was going to ask you how you felt about climate change before you even started this project, but you'd never heard it?

Year 5: Well I didn't understand it.

Year 5: [Teacher] was talking and I was just sitting thinking what on earth is that supposed to mean?

The Year 7 group reported coming across climate-related ideas at primary school and cited those experiences as their main source of knowledge. The Year 8 group had come across climate change before but it had never been an area of concern for them before undertaking these activities.

"Well when I first started learning about climate change, I was like great, I used to say it doesn't bother us, I don't care, I'll be long gone before it affects us and then like when I've started to see like in fifty years it kind of makes you go oops and stuff so I've kind of changed my view towards it." (Year 8)

6.3 Attitudes to climate change

After being asked what they knew about climate change, students quickly moved on to discuss how they felt about the issue prior to taking part in Lead Schools activities. There appeared to be two groups that emerged: those that were indifferent, or thought that climate change was someone else's problem; and those that felt concerned, anxious or sad about what humans were doing to the planet:

"I was a bit scared at first, really, because I didn't know what it was, me. I thought climate change was in Manchester, and it was on the news about all of it. And if the pollution goes all over the world, we're going to go BOOM!" (Year 7)

"I felt like it's not doing anything to me, so why should I bother doing anything?" (Year 5)

"I felt like it's really not my fault" (Year 5)

"I didn't really feel anything, I thought it was just - I didn't know it was something that it actually means. Now I've got a whole notion of - I take care with my stuff." (Year 7)

"I feel awful sad, myself, that we're doing something bad to hurt the Earth when we're supposed to respect it." (Year 5)

Encouragingly for the project, the students reported some large changes to their attitudes as a result of learning more about climate change. Firstly, those that were indifferent previously now felt that climate change was important:

"I thought they were being a bit over-dramatic with all the pictures of polar bears and icebergs. But I've found out how dramatic we should be about it, because it's really bad." (Year 5)

"It's changed a lot for me, because I am bothered now. I thought that it wasn't going to really happen. I thought that other places were going to be all right, but now I feel more like… …Like I'm more interested than I used to be." (Year 5)

One group were asked whether they were happier before they knew about climate change:

> *"I think learning about it is good because then if you didn't do anything about it, it's going to destroy the Earth more, but sometimes you just don't want to learn about it, because you don't want to always get sad and stuff, about how we've got to change our life and stuff." (Year 5)*

This was an important point. Many of the students reported feeling more confident or empowered about climate change. Those that were concerned felt better because they knew what actions they could take to make a difference.

> *"Now I know that it's a really big problem for us to solve, so we've got to try and do whatever we can, like recycling, to stop the Earth from warming up" (Year 5)*
>
> *"I think I feel a bit more confident with climate change and to be able… I'm a lot more confident that after I recycle more, and make sure I don't use as much heat and things" (Year 7)*
>
> *"Now I feel like I want to make things change" (Year 5)*

In Year 8 there was consensus amongst the participants. They felt that climate change was relevant to them, and that it was something they felt empowered to do something about.

> *Year 8 boy: Well I knew about it but I didn't care about it. It was only when I did this –*
>
> *Facilitator: So would you say you care more about climate change?*
>
> *Year 8 boy: Yeah.*
>
> *Facilitator: And is that the same for everyone?*
>
> *All: Yeah.*
>
> *Year 8: Like everyone always felt like you think you know a lot about it and they tell you what will probably happen and it's so much more than you actually know and it kind of makes you rethink everything and just change your mind towards it and try and start doing what you can.*

It was interesting that the Year 8 students, whilst feeling empowered and able to make behavioural changes, were also aware that they could not stop climate change from happening. It was not clear if this resulted in internal conflict, certainly the students felt that making behavioural changes was beneficial. However, it could be that older students are more able to cope with the concept of adapting to climate change and this could be an area which is covered in greater detail for secondary Climate Change Lead Schools.

> *Year 8: The thing is like we're trying to stop it and we're slowly doing it but it's just going to make it slow down.*
>
> *Year 8: It's going to happen sometime.*
>
> *Facilitator: Ok, so you think even, no matter what we do it's still going to happen, it's just a case of what time –*
>
> *[Participants speaking at once]*
>
> *Year 8: Yeah it's just basically a matter of time.*

For one Year 5 group learning about climate change was exciting yet scary at the same time.

> *Facilitator: Ok so the lessons were quite exciting. So how do you feel now about climate change? And what I'm thinking about here is not about how you feel about the lessons but how you feel about climate change itself.*
>
> *Year 5: I don't want the world to melt.*
>
> *Facilitator: You don't want the world to melt.*

Year 5: I read something on the internet about how the ice caps will be fully melted by 2013 so it's a bit scary.

Facilitator: It's scary.

Year 5: And how sea levels with rise and maybe flood the land and then the sharks can come in and so on.

Facilitator: Ok, so is climate change something that's quite scary then?

Year 5: I don't want any animals like to be extinct. Not like mammoths like because of the ice and like penguins.

However scary the students found the idea of climate change, it was also clear that for all the students, learning about climate change and feeling empowered to change their behaviour were intimately linked.

"Ok now because we're glad that we're being taught about it because we need to know about it, we need to know about the environment because then we can help to save it." (Year 5)

…

Year 5: I feel like I've learnt a lot more than I thought – than I knew before and now I know the effects that's going to – that might happen.

Facilitator: So how does that make you feel?

Year 5: It makes me feel quite alright, because now I know what might happen and it won't just come up like a flash.

Any programme that aims to raise awareness about climate change with young people runs the risk of making them sad or anxious, and this was certainly the case for a minority of participants, especially at primary school. This anxiety was allayed if those feelings of sadness or concern were channelled into behaviour change, so students felt that there was something they could do to address the problem. The next section of the focus groups explored these behavioural changes in more depth.

6.4 Behavioural changes

When prompted, students listed several climate friendly behaviours that they do regularly. These included conserving electricity, recycling (both at home and at school), using rechargeable batteries, conserving water, using sustainable forms of transport and influencing others to change their behaviour.

Year 5 boy: I don't keep the tap on any more when I brush my teeth.

Year 5 boy: Like now when I'm not using stuff I turn them off and pull the plug out.

Facilitator: Ok and what did you -?

Year 5: I used to – sometimes I forgot to put the lid on the thing right and then I heard about climate change, about the environment, recycling, so and then I started all the time, I recycle plastic bottles, glass bottles, paper.

Facilitator: Good ok, so do most of you do recycling then?

Year 5: I do it all the time, I've got a big recycling bin.

Facilitator: Ok so you recycle things at home, is that right? Do you recycle things at school as well?

Year 5: Yeah, because we've got a big recycling bin and we put our scrap paper in.

Recycling was a commonly reported behaviour. Interestingly, several students reported that they already had recycling systems (such as different coloured bins) in place at school and at

home. So learning more about climate change did not encourage them to install these systems, but it did encourage them to use them properly:

> *"Well, every time I went and I was just chucking the rubbish in any bin. I didn't know what it meant, so I just dumped, but now I know. I always ask my dad: should I put this in the blue bin, because our box is blue for recycling, or should I put it in the big bin? And he always tells us what to do, so now I know not to put it in just any bin." (Year 5)*

> *"[at school] Some people just put it in any bin, because at the start people were just putting crisp packages in the recycling bin and swapping the bins - the tops of the bins - around, so people would get mixed up with the bin." (Year 7)*

Importantly, the infrastructure is in place in schools and homes for students to be able to easily change their behaviour and positively affect the planet.

Several students commented on their raised awareness of the amount of energy they consume, and how they have changed to be less wasteful:

> *"Before I learned a lot, I used to play on my PSP and watch telly at the same time. I was losing electricity. I used to leave me PSP full on charge even though it was fully charged. I just waste electricity…. Stop doing that" (Year 5)*

> *"And I'm really bad for this; leaving the lights on in the landing, and keeping the door open when I've just come in. Because it's heating up the outside" (Year 5)*

Another area where students reported changes was in sustainable transport:

> *"I have done something different by trying to cycle most of the way to my Dad's… I have never actually had a car. I have never actually used a car except taxis. So try to stop going in taxis and trying to walk" (Year 5)*

> *"I love it, I walk up school and run home every day. I like running." (Year 5)*

> *…*

> *Year 5 girl: My mum passed her driving test the other day. We have decided that we are not going to use the car if we do not need it. Every morning I go to Sarah's. Who lives just around the corner. We are not going to use the car to get to Sarah's.*

> *Facilitator: Was that your idea to do that or what that your mum's idea?*

> *Year 5 girl: Me and my mum both.*

> *Facilitator: How did you come around having that conversation? Who started that?*

> *Year 5 girl: The day my mum passed the driving test we were just talking about cars. We decided that we are going to get a car that does not waste.*

A final area where students reported behavioural change was in influencing others.

> *"I recycle at home and then in school, like in 5th grade, you didn't reuse paper we would normally stick it in the bin. But it's just like we've got a recycling bin. Instead of putting it in a bin, they put it in, if there's a recycle bin in the class. I say, "Couldn't you put in the recycling bin?" and we so recycle a lot." (Year 7)*

> *"My mum always leaves the door open at my aunt's house. And I keep telling her she's not heating up the street" (Year 5)*

> *"I got on their backs about using so much stuff. And now me dad instead of generally dropping me mum off at work and then taking the car to go on his bike." (Year 8)*

> *"My sister already learnt me about climate change because she (…) but now like on a night time, we'll check all the plugs in the house, see that they're all turned off." (Year 8)*

> *…*

Facilitator: What I'd like to do then for the last few minutes is first to ask you if there's anything that you've done differently now that you know about climate change?

Year 5 boy: Well a few of my friends, well I told them about climate change because some of them they just binned a lot of their stuff. And I told them about it and so they thought about it and now so instead of binning a lot of your stuff you should recycle it to stop – because it burns a hole in the ozone and also it's rotting away at the earth and just not very nice.

Facilitator: Ok so you've been recycling your stuff and you've been telling your friends about recycling it as well.

Year 5 girl: My brother and that used to throw away their rubbish and that and then I've been telling them to put it in bins when they see one, because you can damage the world and that.

A really successful activity in this area was the Climate Cops event run by nPower. After an interactive event at school, students were given police officer-style notebooks, and they could 'book' themselves, friends or family members if they saw them wasting energy or performing other climate unfriendly actions. This worked by the child (the climate cop) writing out a ticket and asking the other person to sign it and agree to a forfeit, such as helping with homework. This appeared to work well to give the students a fun mechanism for influencing others to be more climate friendly. Examples of how one Year 5 group had used this included:

"I started to do better to turn the lights off when I need to. Normally I leave them on. I give my mom and dad a crime and myself. I learned to switch off the lights." (Year 5)

"Me mum, I say sign this piece of paper, its part of me homework to play climate cop" (Year 5)

Many other Lead Schools reported in their termly catch-up meetings that they had delivered activities with similar elements to some of those in 'Climate Cops' of their own accord, such as establishing 'climate monitors', 'climate champs' and 'green police', and they had experienced similar successes.

The qualitative work has identified that students involved didn't have a deep understanding of climate change prior to the project, and that learning about climate change and its impacts has changed how they feel about the issue and stimulated them to change their behaviour too.

7 Feedback from teachers

Feedback from teachers was collected in several ways. Regular meetings between teachers and the project manager allowed issues to be discussed and responded to throughout the lifetime of the project. In addition, teachers were asked to give quantitative feedback via a questionnaire on each Module (reported in the Appendix), and to complete a reflective, qualitative case study at the end of the project period. Teachers at the focus group schools were also interviewed during the focus group visits.

A total of 31 case studies were collected from the total number of Lead Schools - 20 case studies were submitted from primary schools or middle schools that worked with primary-age students. 11 case studies were received from secondary schools or middle schools that worked with secondary age students.

This section provides a synthesis of the case studies, drawing out common themes from teachers.

7.1 Key objectives

Primary teachers cited the following key objectives for participating in the project:

- Personal interest in or commitment to climate change, including wishing to educate and influence children to help mitigate its effects;
- That it supported teaching of the subject that already went on or was planned, or that it would help embed less structured activities in curricula;
- Links with school strategies such as Eco Schools programme, DCSF's Sustainable Schools '8 doorways', other focus at school level;
- That there is demand / interest in the topic from students;
- CPD for lead teachers including experience in project work, subject knowledge and leadership;
- Attractiveness of the project, that it sounded interesting or exciting, that the Project Leader was someone they wanted to work with, that SLC NE were delivering, that they could work with other schools.

For secondary teachers, the motivations were broadly similar, however there was a greater focus on addressing climate change misconceptions and improving the teaching and learning of climate change material at KS3. Several secondary teachers also mentioned being involved in earlier stages of the project motivated them to continue.

7.2 What was delivered?

Not all primary teachers stated what Modules they had delivered to which year groups, however of those that did it appeared that the earlier modules were delivered most frequently (modules 1-6 cited by 12, 9, 5, 6, 2 and 2 teachers respectively) with Year Groups 1-6 involved by 2, 2, 4, 5, 8 and 6 teachers respectively, indicating that most teachers delivered the modules to Years 4, 5 and 6.

Secondary teachers were also unclear in which modules were delivered to which year groups. Modules 1-6 were cited individually by 4, 2, 0, 2, 1 and 1 teachers respectively; however several said they had delivered activities from several or all modules. Two teachers reported working with Year 7 students and 2 reported working with Year 8.

Overall, several schools 'dipped in and out' of the various Modules to deliver difference activities at different times. Therefore, they may not have reported 'delivery' of a particular Module if they felt that they had not completed all suggested activities. This is something that can be emphasised in future, so that teachers feel they have taken part across the Modules and can report back, no matter how many or how few of the suggested activities were delivered.

7.3 Evidence of success

A range of types of evidence for success were described by primary teachers in this section. The following broad themes emerged:

- There was a positive response from staff to the modules, with several teachers indicating that more staff would be taking up the project in future;
- Many said that the Modules helped students understand the topic and in some cases boosted achievement;
- Positive influences on students' attitudes and behaviours related to climate change, which in one case led to reduced energy bills for the school!
- Positive influences on staff attitudes and behaviours related to climate change;
- CPD for staff;

- Stronger links between schools and communities, and in some cases schools and businesses, or schools and other schools (e.g. secondaries and feeder schools);
- Cross-curricular links and links with other climate related schemes;
- Press coverage.

Secondary teachers appeared to be stricter with their definitions of 'evidence' for success; several commented that they had insufficient time to evaluate the impact of the work. However several described students' learning as a positive outcome and, like their colleagues in primary schools, impacts on students, staff and teachers in terms of knowledge, attitudes and behaviour were identified by some. The value of networking was also highlighted. For some schools, the project had opened doors to other climate change-related opportunities for students and teachers.

7.4 What did and didn't work?

Primary teachers identified a range of successes and challenges with the project:

What worked	What didn't work
• The Module materials and knowledge base: easy to use and written by teachers • The network support and ability to collaborate with other teachers • Flexibility to deliver some or all Modules and activities • Creative, self-directed activities that were engaging for students • In one case, a particularly successful collaboration with an external partner was mentioned	• Trying to fit it all in to the curriculum! A few were 'overwhelmed' with the potential amount of material • Lack of resources for Foundation, Y1 and Y2 • Not all websites were accessible • Getting to SLCNE not always convenient

Some of these were echoed by secondary teachers:

What worked	What didn't work
• Creative activities and activities that encouraged students to look at the issues from different perspectives • The depth of the project compared to one-off activities • Lesson plans • Working with other schools and sharing experiences with teachers • Delivering activities off-timetable • Students' enthusiasm • The flexibility to 'mix and match' activities from the Modules • Visits (for one school)	• Time constraints were a major barrier • It was not possible to access web links in several schools (notably YouTube) • For some teachers, the full SoWs limited flexibility • For one teacher, a challenge was getting other staff on board if they hadn't attended the CPD session • One teacher felt the SoWs needed clearer overviews and links for students at different ability levels.

7.5 Teachers' personal and professional development

In this section, most primary teachers cited the enjoyment and satisfaction of teaching the Modules and seeing positive impacts on students. Some also commented on skills they had developed, such as leadership, creativity and confidence in the subject.

Secondary teachers were less forthcoming with their feedback in this section. Like their primary school colleagues, they felt the positive responses from students were rewarding, and several mentioned the collaborations and networking as valuable. One teacher said the programme gave a useful insight into how climate change would be approached in primary schools.

Overall, several of the 31 case studies reported that their students had taken climate change messages home and were encouraging many of the 'climate friendly behaviours' outlined earlier in this report. Some teachers had also heard parents talking about children switching off appliances (without necessarily advising their parents that they had done so!) Others experienced students bringing work into class that they had done on climate change at home **without** it being set as homework.

7.6 The future

All primary schools said they would at least continue to deliver the Modules in future and most hoped to extend the work in some way. The various options for extending the work listed by teachers were: involving more year groups, sharing materials with other teachers to involve more classes within the school, embedding the Modules in the curriculum delivered by the school, making climate change a dedicated area of work, having more sessions delivered off-timetable, creating stronger links with other areas of the curriculum e.g. geography or creative arts, working with other schools e.g. with clusters or feeders, and for one school forging links with local businesses. One teacher has delivered INSET to colleagues in the school, helping roll the activities out across Key Stage 2.

Similarly, secondary teachers were keen to continue and extend the work. At this level, linking to different subjects appeared to be a higher priority, with teachers that had initially placed the modules in the citizenship curriculum looking to embed them within Geography and Science. One teacher had already delivered CPD within school to roll the modules out via her colleagues, and others were looking to utilise schools' off timetable arrangements to deliver activities. The value of collaboration within and outside school was highlighted.

7.7 Comparison

Teachers were asked whether/how CCSP activities compared with other schemes they were involved in. Primary teachers listed a great number of schemes. These were: Eco Schools, Sustainable Schools, Green Flag, Healthy Schools, Prince's Rainforest, Arts Mark, Food for Life, International award, School travel Plan, Let's Grow Appeal, British Council Connecting Classrooms, Fair Trade, Earthkeepers, Walk to School Week and the Primary Science Enhancement Project. In addition one school mentioned Every Child Matters. For secondary schools the list was shorter: Eco Schools and Sustainable Schools were mentioned again, in addition the Comenius scheme, the ASDAN environmental award and in-school eco-clubs or green teams appeared in the response sets. One secondary is also linking with Building Schools for the Future to incorporate some ideas about sustainability.

Some primary teachers reported not being involved with any other initiatives, but for those that did, they felt that the CCSP complemented them well. Several also commented on how well managed and organised the project was. Few secondary teachers made other comments, although one felt that an advantage of the project over other schemes was the provision of useful lesson plans. Some also commented that the depth of the project was a success factor when compared with one-off activities on the subject.

8 Conclusions

This study highlights the complexity of teaching a subject like climate change in schools, and underlines the interrelationships between knowledge, attitudes and behaviours.

This concluding section begins by summarising and commenting on the findings from the evaluation, before making some comparisons with other studies in the field.

8.1 Findings from the study

Overall the activities were well received, especially those that were interactive, practical, creative and self-directed. Students appeared to appreciate the cross-disciplinary nature of the activities, which allowed them to draw on skills and knowledge from a range of subjects. However while popular with students, this approach can be more problematic for teachers to deliver, especially at Key Stage 3. Some individual activities were criticised, but students appeared to respond well to the suite of activities overall. A useful suggestion for improvement from students was the inclusion of more school trips: these have the potential to bring the topic to life.

In Year 5, students had little prior knowledge about climate change. The quantitative work indicates that students that participated in the project had achieved several learning outcomes that their counterparts in the control group had not. However there were also some misconceptions hat had crept in here, notably the role of the ozone layer in climate change, and confusion between general respect for the environment (e.g. not dropping litter) and climate change mitigation. The qualitative work has identified that the main messages about what climate change is and the implications for the planet appear to have been communicated clearly.
Students were more likely to accept the idea that climate change will kill plants and animals at the second stage.

Significant (positive) shifts in responses to four of the attitudinal statements were observed for Year 5 students, that were not observed in the control group. There is a subset of younger students who became quite anxious about climate change, and some with worrying misconceptions about the world ending. This is a cause for concern for the project, though it appeared to be prevalent in certain classes rather than across the board. It would be helpful to emphasise to teachers to be discerning about additional materials they deliver related to climate change if they are not already part of the Lead Schools Modules. Additionally, perhaps teachers that have successfully managed to educate to empower rather than concern their students could share good practice here, or it may be that other factors such as home culture could be influencing this (likely a combination of many factors). One student suggested 'asking us how we feel' as an improvement for the project; there could be scope for some discussion-based activities to allow concerns to be voiced and addressed. Of course climate change is not the only topic that children might find alarming when they first meet it. Perhaps good practice could also be taken from other areas of the curriculum such as PSHE. This type of concern did not appear to be an issue at Key Stage 3.

Quantitatively, only a few significant changes were observed in the quantitative measures of changes in behaviours and students' attitudes towards them in Year 5, however this was against a backdrop of students in the control group reporting doing these actions less frequently over the period of the study. The comparator group was not large, but this indicates that sustaining and slightly improving behaviour is a strength of the project. In the focus groups, individual students were prompted to discuss how their actions had changed, and many talked about sustainable transport, recycling, conserving energy and influencing others. These themes also arose from the evaluation questions in the electronic surveys. So it appears that the project has influenced students in these areas. This was especially effective where mechanisms to support influencing others were provided, such as the climate cops activity. Crucially, it appears that families and schools have been supportive

of the behavioural changes, for example by providing recycling facilities and discussing travel options with students. Without this support, students could be left feeling powerless and unduly concerned about their impact on the planet. Students also appear to be leading by example on 'climate friendly behaviours' at home and sharing their learning with their families.

There is no doubt that the approach to incorporating activities into the curriculum is a valuable one. By comparison with enrichment approaches, it allows material to be covered in greater depth, with a range of activities that appeal to students' diverse learning styles. Importantly, working with teachers they know (especially at Key Stage 2) should facilitate the voicing and addressing of students' concerns. Primary school teachers are uniquely placed to introduce this complex topic to young learners in a way that can empower them to take action without causing undue distress. Continuing to bring teachers together to discuss approaches will continue to improve delivery.

The biggest barrier reported by teachers was 'fitting it in'. This had several meanings, including reference to teachers' busy schedules, competing priorities at schools balancing any number of schemes and agendas, packed curricula and competition between departments or subject areas for sessions off timetable. From the case studies, it is clear that the flexibility in delivery was an important success factor, along with the fact that the materials had been designed by other teachers so were easy to integrate into various subject areas. A minority of teachers perceived that aspects of the project lacked flexibility at various stages throughout the pilot year, and this perception was a barrier in itself. It was also clear from the case studies that teachers that had only delivered a few activities in the pilot year were planning to deliver more, and were extending the delivery of the modules through engaging other staff in school to reach more classes, year groups and subject areas.

I must end this part of the conclusion with a caveat; while this evaluation identifies a range of positive impacts on students and a few of their concerns, much of the material contained in the Modules was not delivered in the study schools within the timeframe of the evaluation. The impact of building on the initial work evaluated here is unclear: it could motivate students further, or it could lead to fatigue with the subject area. From the Module evaluations contained in the Appendix it appears that the Modules became less popular as they progressed; although this was not reflected in the focus groups, and could instead (as some teachers commented) indicate that students had tired of completing the feedback forms. Working closely with teachers and possibly conducting some further research with students that have been working on climate change over an extended period will be crucial to strike an appropriate balance between satisfying learners' interest in the subject and overdoing it to the point where they switch off.

8.2 Discussion

This section sets the findings from the study in the wider context of young people's understanding of and attitudes towards climate change.

There is very little work on children's attitudes to the environment generally (Evans et al, 2007) and even less that specifically addresses climate change. While academic research has focussed on the attitudes of adults as predictors of pro-environmental behaviour, work with students tends to focus on their conception of, and relationship, with nature (Evans et al, 2007).

This lack of literature addressing children's understanding, knowledge and attitudes towards the environment, and the impact of educational interventions on these factors, stimulated Rickinson (2001) to undertake a critical review of the literature in this area. While the

review is slightly dated, the findings from this evaluation have a great deal of relevance to Rickinson's comments.

The literature comprehensively reviewed by Rickinson demonstrated that there are no clear trends in environmental knowledge, understanding, attitudes or behaviour. In the review, Rickinson revealed that factual knowledge around environmental issues is consistently disappointing and there is a general downward trend in knowledge in the mid-teens. However, at the time of the review there was no work which tracked students' development over time which makes it very difficult to determine the impact of interventions within school. This lack of evidence had not improved by the time Evans et al (2007) were undertaking their research into developing new tools to measure children's environmental attitudes.

As with this evaluation study, Rickinson (2001) found that young people consistently and persistently retain misconceptions such as there being a causative link between the hole in the ozone layer and climate change. It was not clear from the literature why this is the case, but the authors from the studies reviewed by Rickinson suggest that inaccurate use of terminology in the classroom could be an influencing factor.

It has been suggested that the students taking part in this project felt able to cope with some of the problematic future scenarios because they were empowered to undertake environmentally friendly behaviour as an integral part of their learning. This is interesting as the literature suggests that while young people are generally positively predisposed to environmentally friendly actions, this positive attitude lessens when the actions start to impinge on their own lives (Rickinson, 2001).

A significant outcome for this project was the evidence that children talked to their friends and family about environmentally friendly behaviour and influenced their families' behaviour. This is not something which happens automatically as Rickinson's (2001) review demonstrates that there are a range of factors which influence whether young people pass on their newfound information. These include (but are not limited to) socio-economic status, levels of education, enjoyment, relevance and authenticity. As the students clearly enjoyed some of the activities within this project, this could be one reason why they were able to talk with their families.

This evaluation report is unusual when located amongst the academic literature as it specifically asked students about their learning experiences. Rickinson (2001) highlighted this as an area where further work was needed, but stated that of the few studies that had been undertaken:

> *"The common picture emerging from this small group of studies [about students' experiences of the lessons themselves] is that of students as active processors, and critical consumers, of learning situations such as environmental lessons, fieldtrips and project work. The key point is that the students in these studies were not unaware or uncritical of the nature of their learning situations, but instead evaluated and responded to them in active, critical and individual ways"* Rickinson, 2001

This is certainly a view supported by the focus group data for this report. It endorses that the approach taken by the CCSP, while not without challenges in this complex area, is an effective way to teach students the realities of climate change and empower them to take action in their own lives and influence others.

9 Recommendations

9.1 Recommendations for the Modules

1. **Review the suites of activities in each Module to respond to student (and teacher!) feedback**. Consider how these reviews will be undertaken; the Module questionnaires did not receive a good return rate throughout so perhaps this is not the ideal method. Teachers may wish to appoint a few students in their class to discuss each Module within small groups, then bring the feedback to the network, or they may wish simply to draw on their own professional experience to reflect on and discuss the efficacy of each activity and Module.

2. **Introduce mechanisms to identify misconceptions** at the end of each Module; students themselves suggested games and quizzes. Teachers can then decide if the misconceptions are serious enough to need to be addressed for their students' year group/individual needs. It is also important to understand and address teachers' misconceptions, especially at primary school. Unlike the students on the project, teachers did not necessarily learn about climate change at school and may have misconceptions of their own that they are passing on to students. Introducing additional CPD for teachers may be helpful.

3. **Be aware of students' concerns at Key Stage 2** and plan activities that allow them to share these concerns in a safe way, so they can be addressed. Unfortunately there are many myths about climate change, and with access to the internet increasingly available it is easy for students to exacerbate their concerns. Continue to reinforce what students can do to make a difference about climate change and encourage an ongoing dialogue about the issue between teachers and students.

4. **Build on the network of teachers and schools to allow the activities to evolve**. Consider co-developing some activities with students as well as teachers, and continue to share and celebrate the contributions of all. Build in mechanisms to frequently update materials in this rapidly changing area; with teachers adapting activities and creating new ones all the time any repository for materials could soon become unmanageably large. Ensure that the management of any such repository is appropriately resourced if it is to remain useful. Encourage teachers to be discerning about new activities they choose to add to the Modules.

5. **Identify some engagement and enrichment opportunities for each Module to enrich students' experiences**. These could involve trips or visits into school from external speakers or organisations. The business and community links built up by some schools could provide a useful starting point, as could other resources such as the STEM Directories or Association for Science and Discovery Centres.

9.2 Recommendations for the CCSP

6. **Capture and communicate the various ways that teachers have delivered activities, highlighting flexibility** and accessible activities that could provide a starting point for new schools coming on board.

7. **The network of teachers is one of the most positive outcomes of the project, so continue to explore ways to support and add value to that network**. Examples could be sharing good practice in cross-disciplinary working at Key Stage 3 and for teachers at middle schools, sharing practice in leveraging the support of SLT in school, working with communities and businesses, whole-school activities.

8. **Encourage Lead Schools teachers to support new teachers that are coming on board.** This will help expand the impact of the project in a sustainable way while building leadership skills in the Lead Schools teachers. Consider the most appropriate ways to recognise and reward teachers for this work, perhaps through existing SLC mechanisms or wider schemes such as TLA or moving towards AST status.

9. **Build in a sustainable evaluation strategy for future activity.** Understandably this is unlikely to include a before-and-after study, but the qualitative work was very illuminating and could provide a basis for ongoing evaluation to complement the tools already used by Science Learning Centre North East in evaluating their CPD provision. Lead Schools teachers may be interested in taking an active role in this aspect, especially any that are engaged with TLA or Masters' studies.

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Appendix

Schools that responded to the first stage of the e-survey.

Year 5

School	First stage	Second stage
Acre rigg	23	-
Alderman Leach	10	10
Byker	27	-
Elwick Hall	14	-
Gurney Pease	1	1
Hart	15	14
St Bernadette's	20	-
St Wilfrid's	3	-
Yarm	56	25
Bedewell	36	17
Macmillan Academy (secondary: had used incorrect link here)	19	-
Ox Close	16	-
Marley Hill	11	12
Richard Avenue	48	-
New York	23	19
John E Batty	28	56
Mill Lane	24	21
Dr Thomlinson / Rothbury	43	-
Lingey House (control school)	21	40
Harrowgate Hill (control school)	84	44
Unknown	11	5
Total	**533**	**267**

Year 7 / 8

School	First stage	Second stage
Macmillan Academy	133	15
Walbottle	31	14
Norham	42	1
Jarrow	14	28
St Hilds	6	10
Hummersknott	35	-
Unknown	5	2
Total	**266**	**70**

CCSP focus group schedule

Part 1: Introduction

- Group names and year groups
- Explain purpose of focus group
- Explain independence from school/project
- Explain anonymity

Gain consent for recording

Part 2: The activities

- What climate change activities have you done in / out of school?

Write on post it notes

- Rank: according to enjoyment
- Rank: according to learning
- Discuss impressions of activities
- How do they compare to other lessons?
- How could they be improved?

Part 3: Impacts on students

- How much did you know about climate change before the project?
- What types of things do you feel you have learned?

- How did you feel about climate change before the project?
- Has taking part changed how you feel about climate change?

- Have you done anything differently as a result?
- Have you told anyone at home about climate change or influenced their behaviour?

- Are there any other changes?

Part 4: Thank and close

11 Module evaluations

11.1 Sample

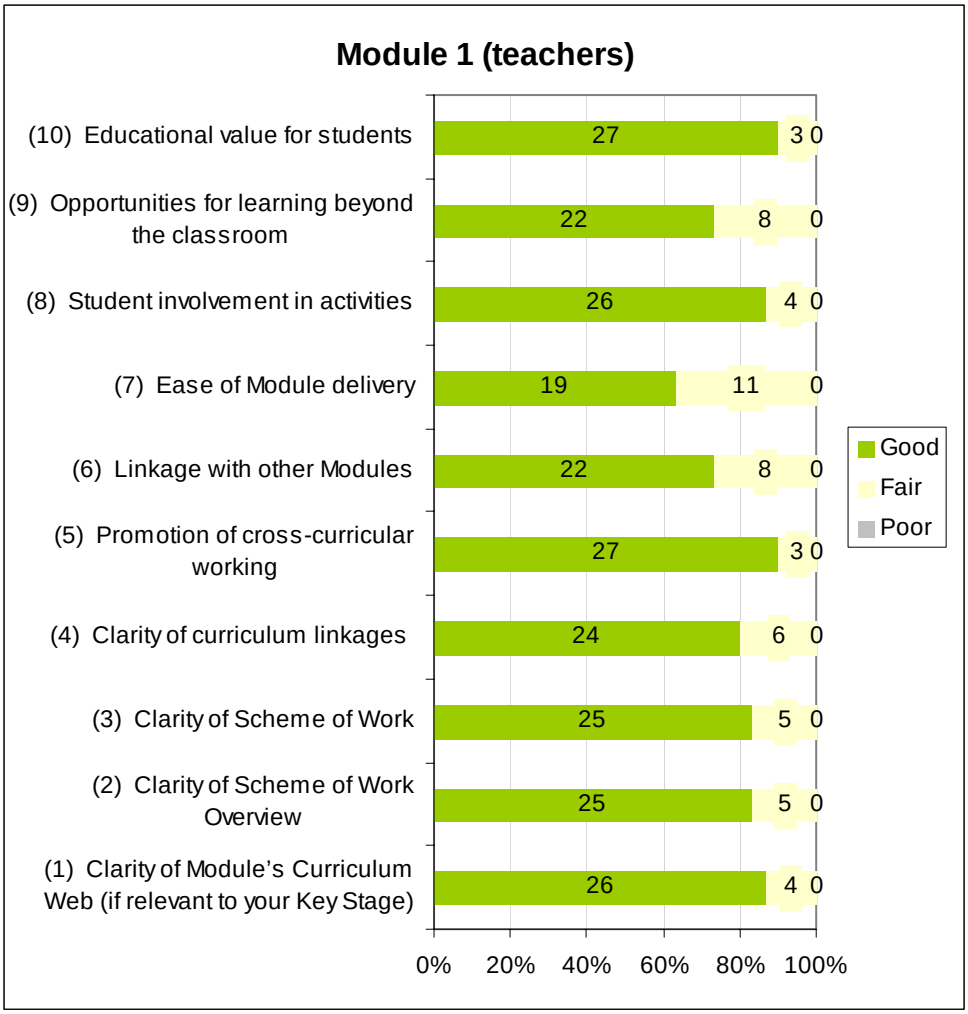
Here are the numbers of forms that were returned during the reporting period:

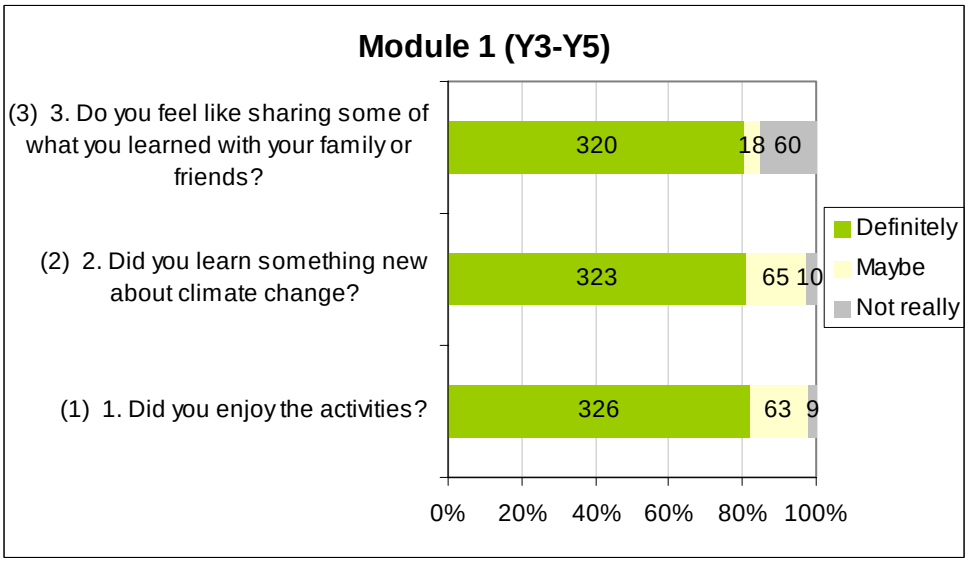
	Module					
	1	**2**	**3**	**4**	**5**	**6**
Primary teachers	30	7	1	2	1	0
Y3-5	398	92	0	0	51	0
Y6	48	21	0	31	18	0
Secondary teachers	6	2	2	4	0	0
Y7-10	128	31	19	17	0	6

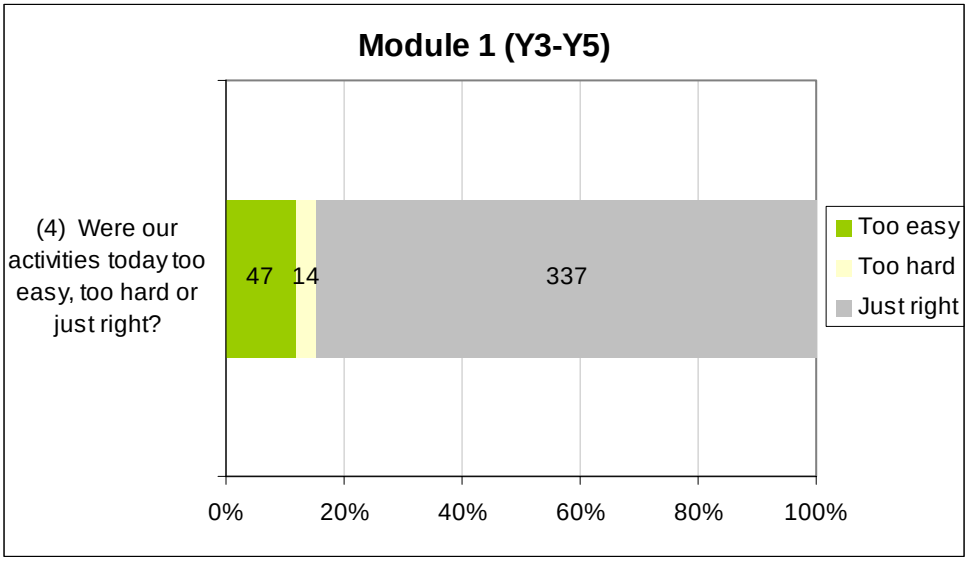
Data are presented graphically where 5 or more teachers or 10 or more students responded.

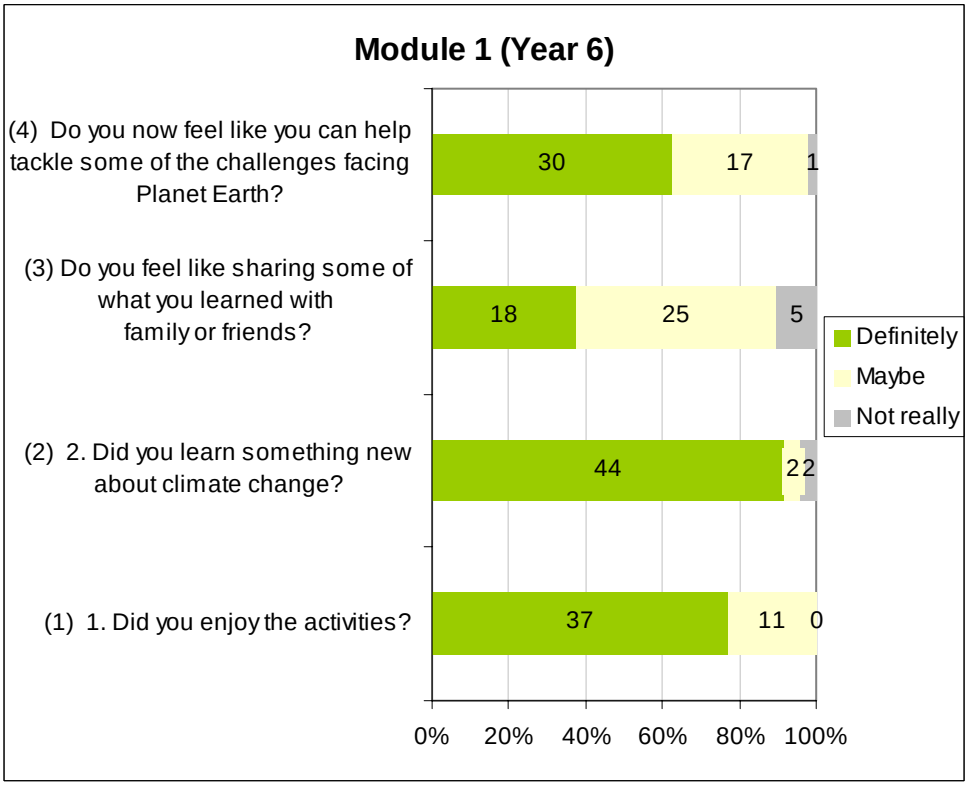
11.2 Key Stage 2

11.2.1 Module 1

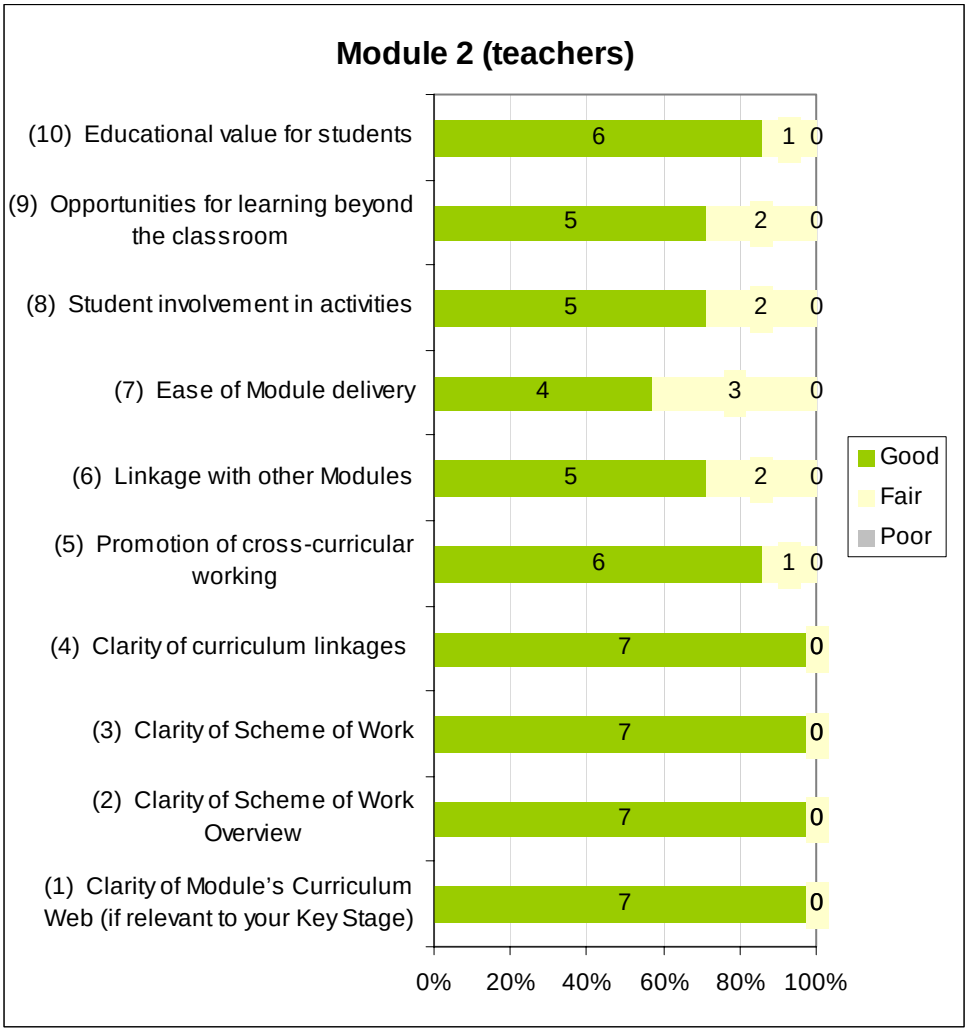


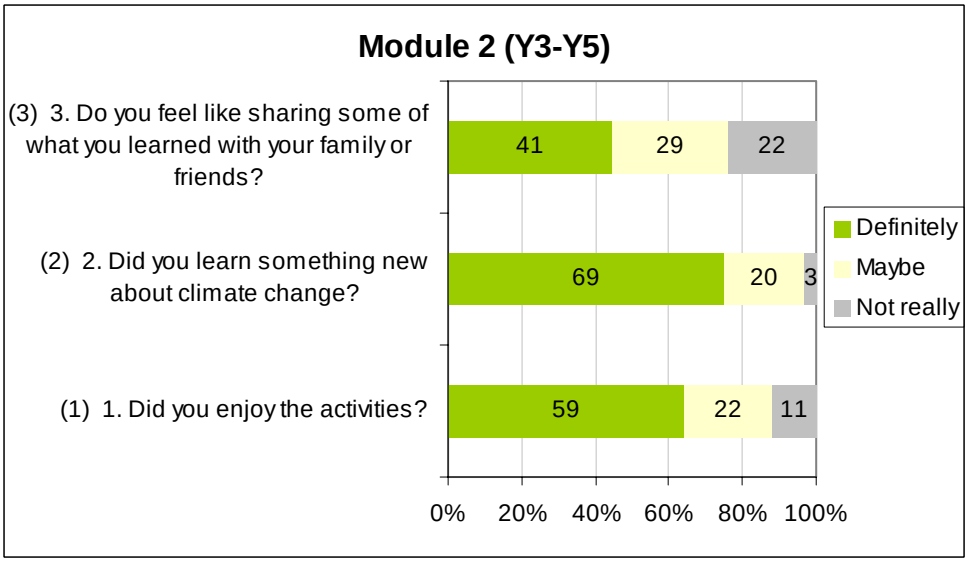


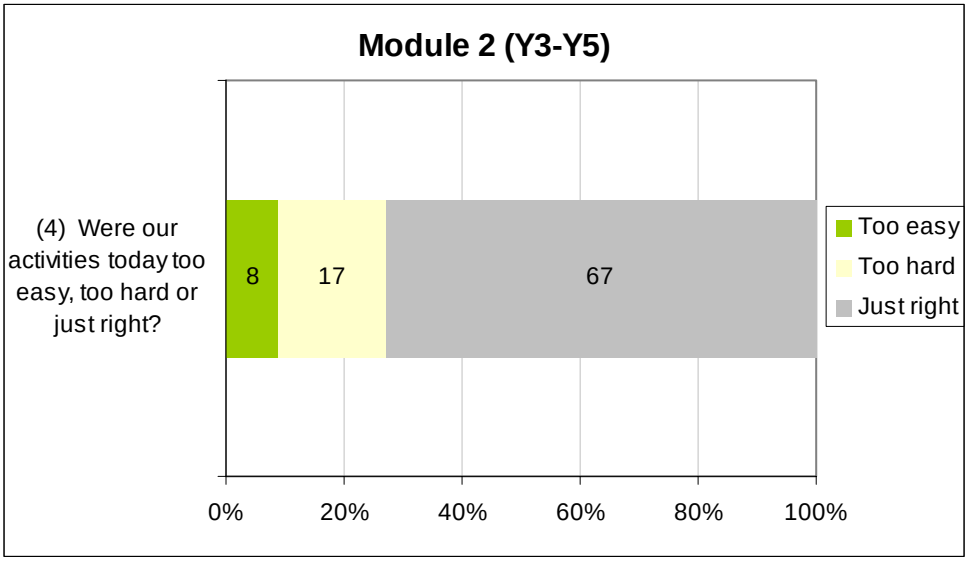

Module 1 (Y3-Y5)
(4) Were our activities today too easy, too hard or just right?
47
14
337
Too easy
Too hard
Just right
0%
20%
40%
60%
80%
100%

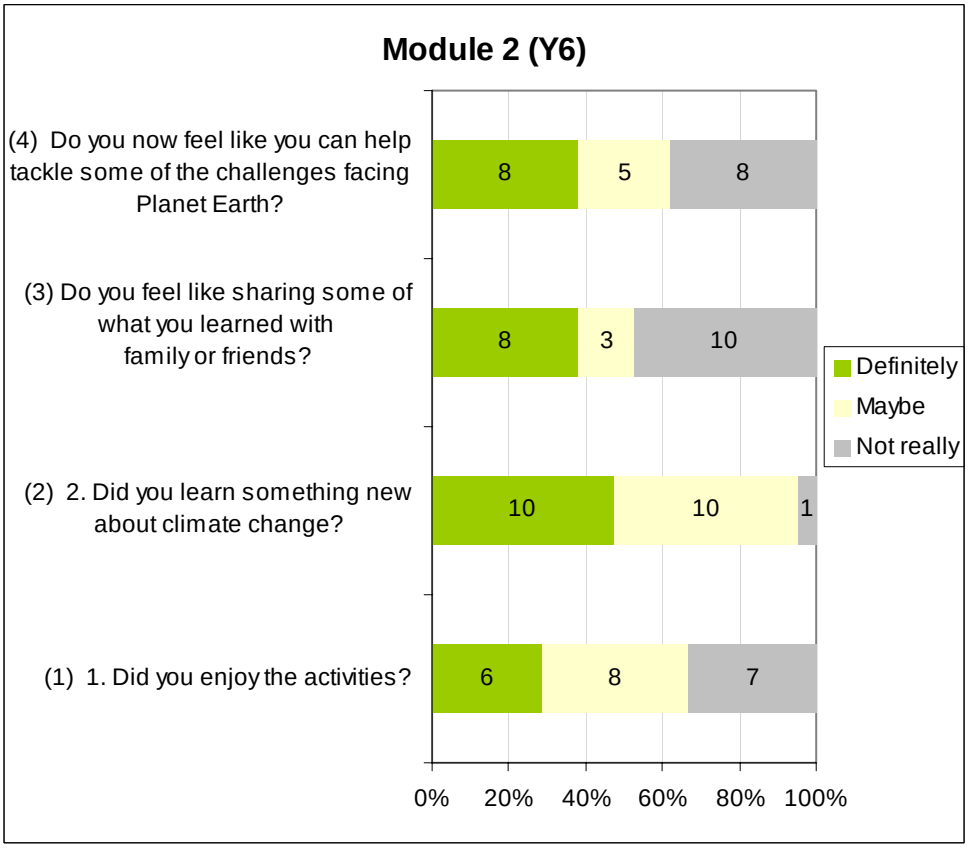

Module 1 (Year 6)
(4) Do you now feel like you can help tackle some of the challenges facing Planet Earth?
30
17
1
(3) Do you feel like sharing some of what you learned with family or friends?
18
25
5
(2) 2. Did you learn something new about climate change?
44
2
2
(1) 1. Did you enjoy the activities?
37
11
0
Definitely
Maybe
Not really
0%
20%
40%
60%
80%
100%

11.2.2 Module 2





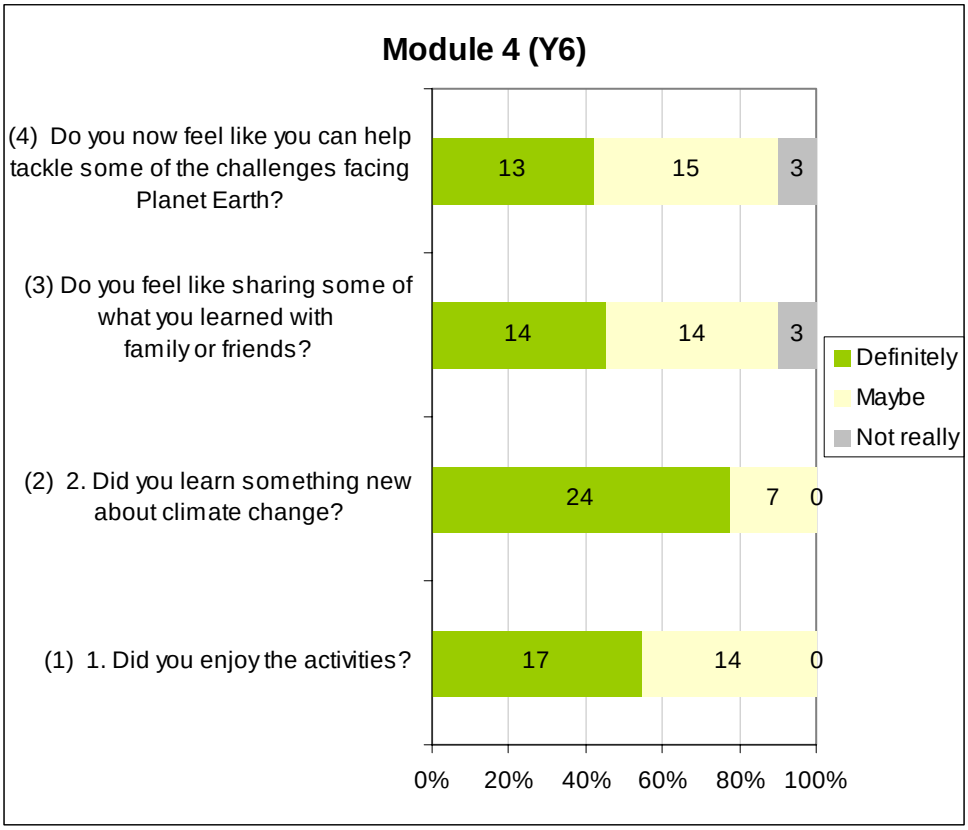




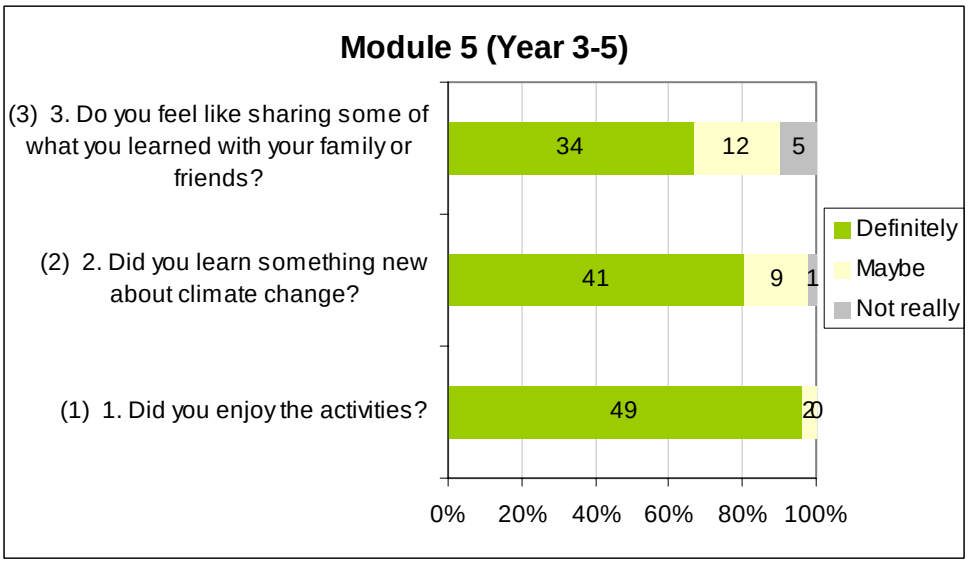
11.2.3 Module 3

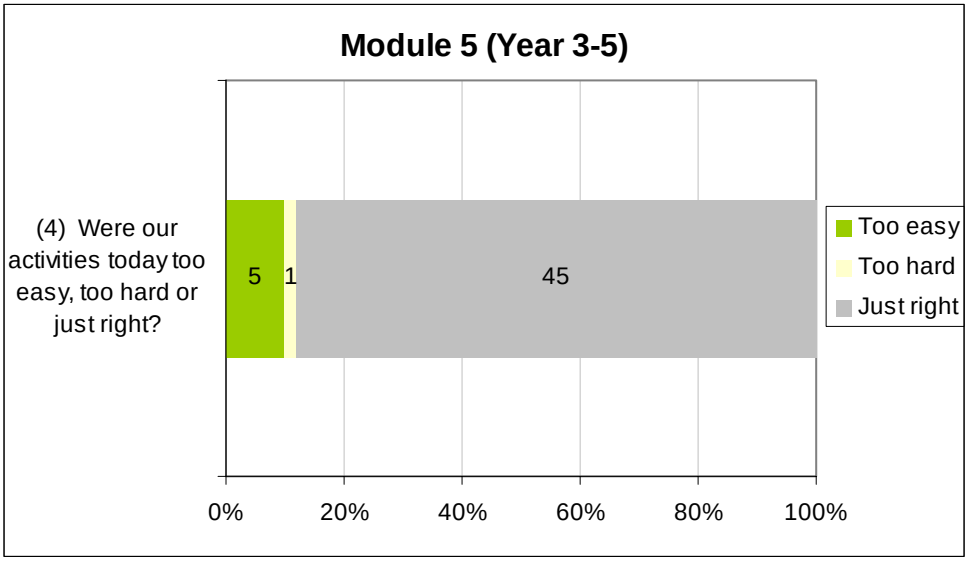
None returned.

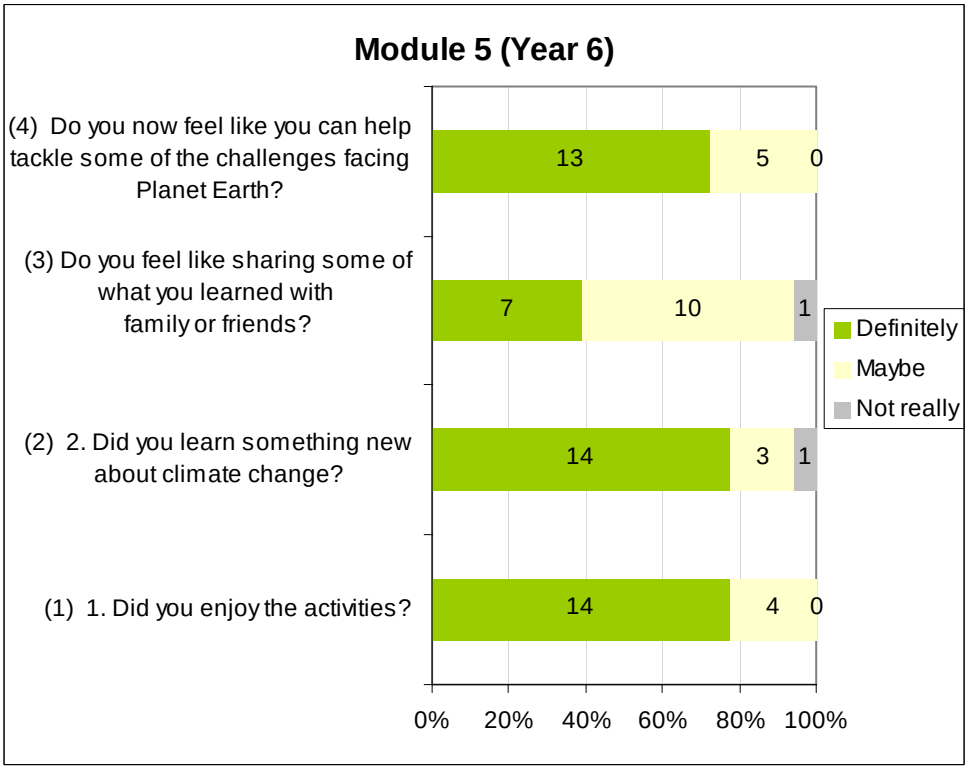
11.2.4 Module 4



11.2.5 Module 5





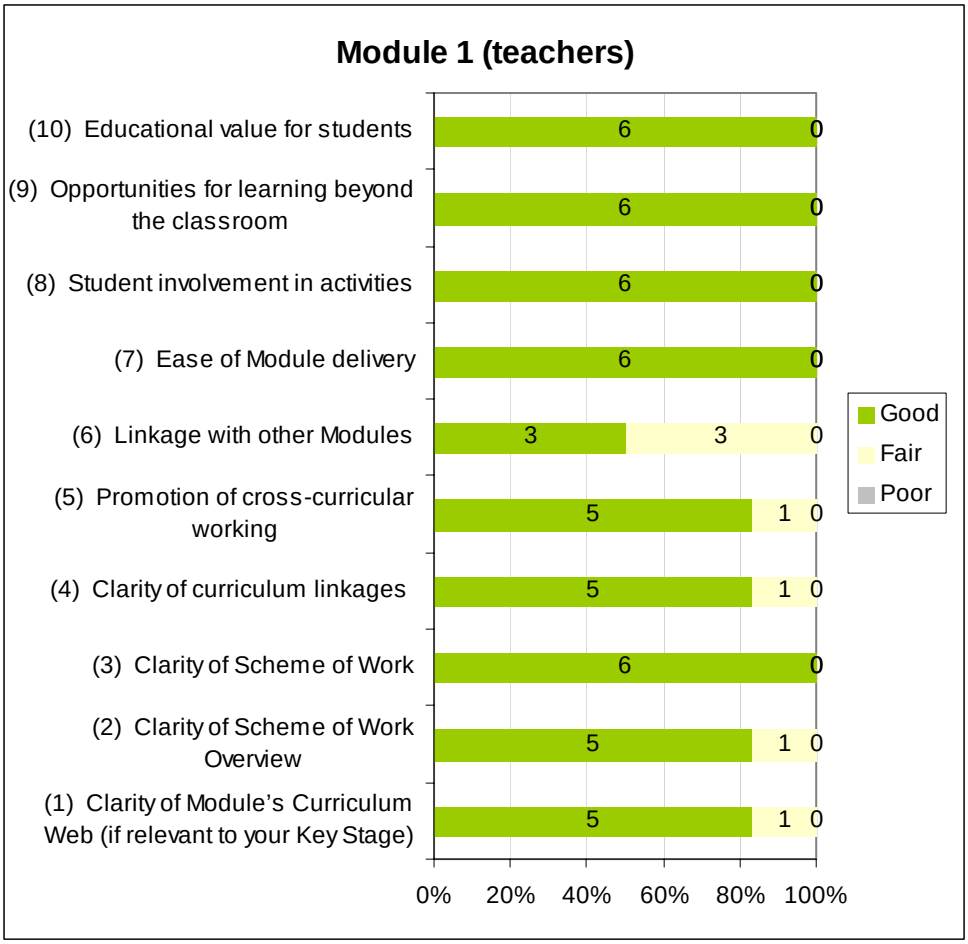


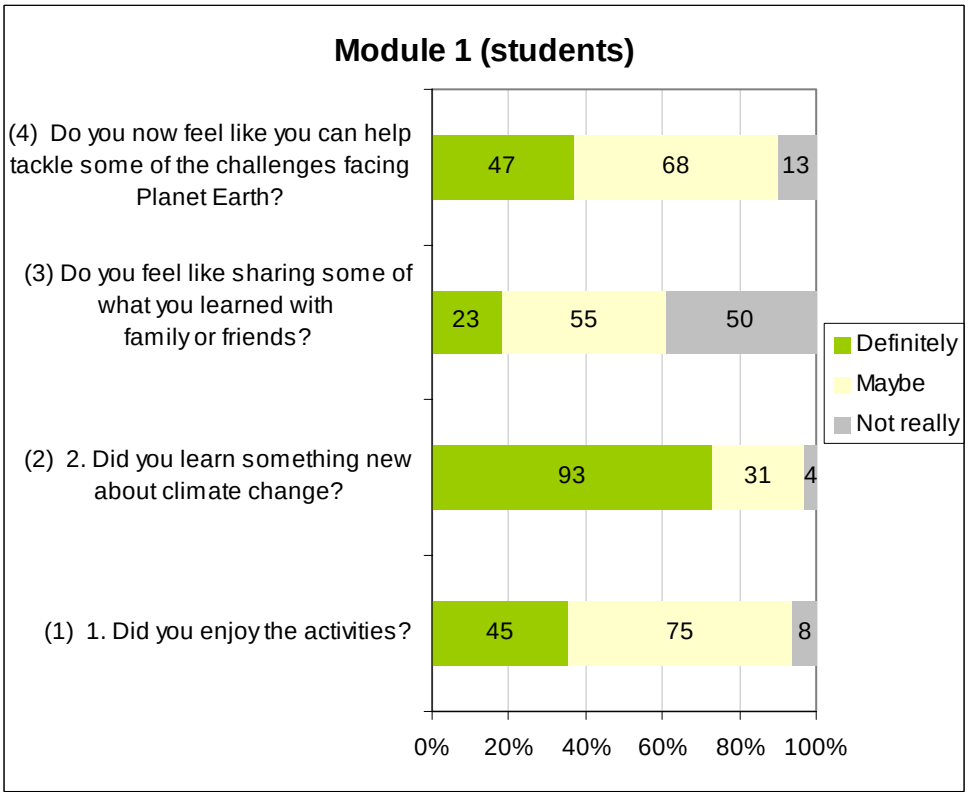
11.2.6 Module 6

None returned.

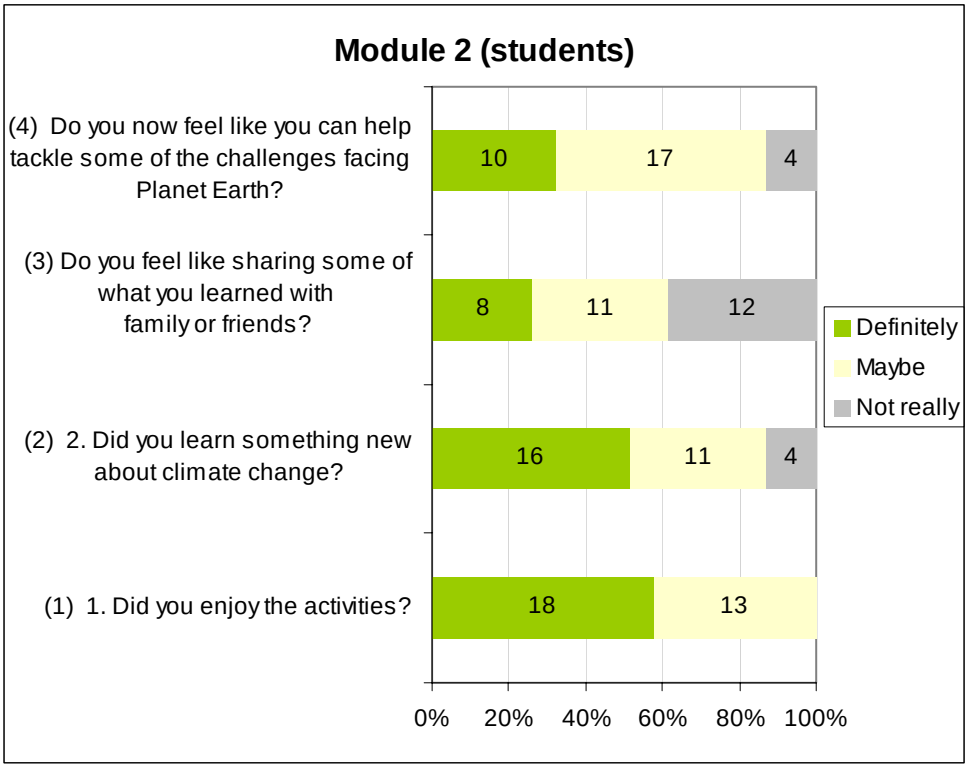
11.3 Key Stage 3

11.3.1 Module 1

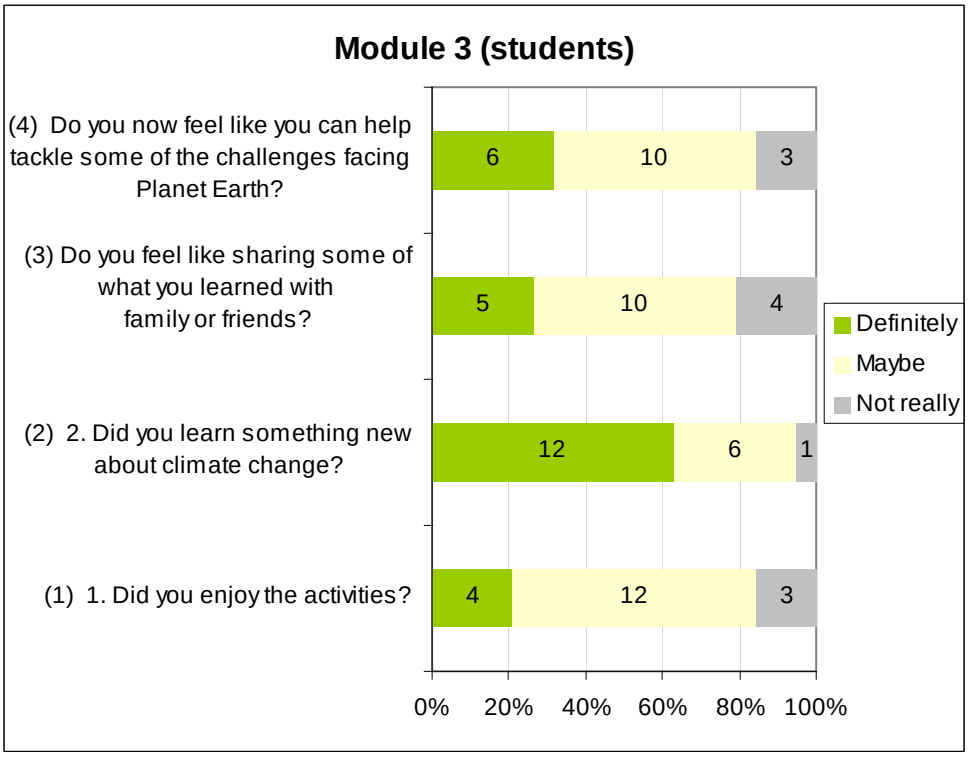




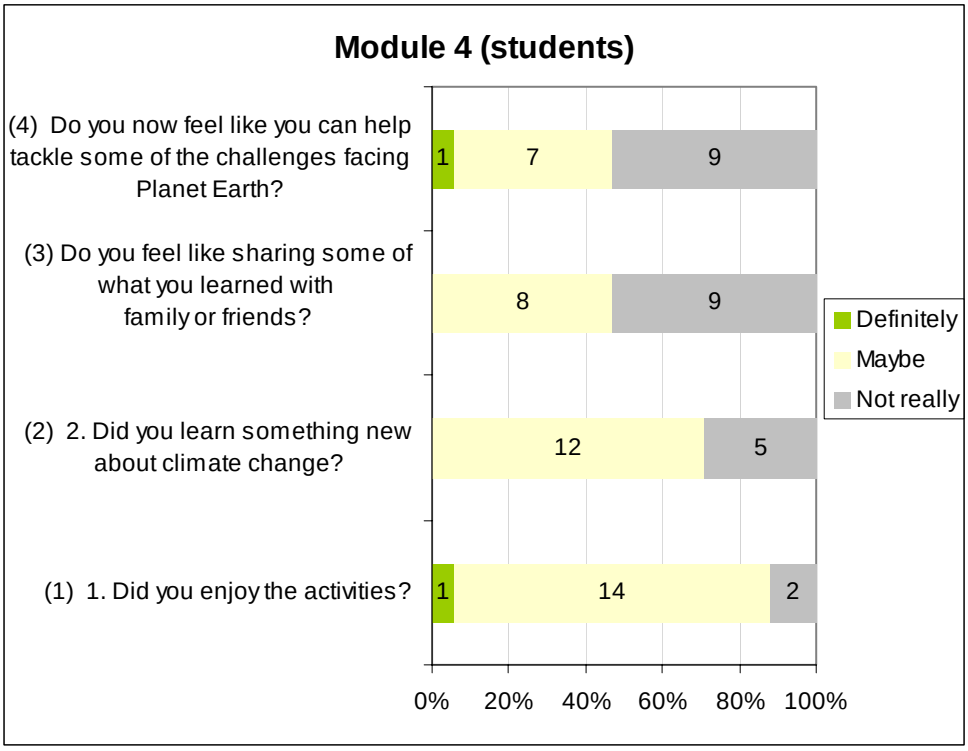
11.3.2 Module 2



11.3.3 Module 3



11.3.4 Module 4



11.3.5 Module 5

None returned.

11.3.6 Module 6

None returned.

11.4 Comments

It appears that responses to the Modules have become more negative as the project progressed, however teachers pointed out in the open responses that they felt this was due to 'questionnaire fatigue'; where students became bored with completing the same forms repeatedly. Consequently, we recommend rethinking the evaluation strategy for the individual Modules.