Investigating the relationship between gaining arboricultural knowledge and understanding from sustainable development learning for year 3 / 4 children

Anthony Derrick Pickering
MA Education for Sustainable Development
University of York
Department of Education
February 2012

Abstract

The main aim of this research study is to explore Key Stage 2 pupils' knowledge about the maintenance of trees in the urban area, its contribution to a sustainable environment, and how the school's education for sustainable development has contributed to this.

It is widely accepted that trees have a significant role to play in sustainability. When discussing this it appears that these trees are usually considered to be growing in far off tropical environments or in rural environments and not local urban areas. Trees have a significant role to play not just in capturing carbon, but by providing shelter and shade amongst many other things in urban areas. However trees become more susceptible to direct and indirect damage in urban areas due to the pressures of urban living placed upon them.

At this time there has been no study of the impact of sustainability learning and the knowledge and understanding gained to contribute to sustainable tree care by key stage 2 children.

This research study investigated sustainability learning delivered to key stage 2 pupils by means of analyzing a questionnaire completed by twenty five children and by interviewing focus groups of four children and their learning facilitators (five adults) to realize the knowledge and understanding they had gained for sustainable tree care.

As a result of completing the above we learned that limited transferable knowledge had been gained by the children from activities mainly linked to tending to a school allotment and attendance at a gardening club. However cross curriculum learning had also supported this.

The implications of the findings are that suitability learning needs to occupy a more central and underpinning role in the curriculum, which needs strong cross curriculum support to especially support the gaining of knowledge and understanding for tree care.

Contents

Acknowledgements

I would like to show my gratitude to my supervisor, James Pitt, for his guidance and support in this endeavour. Without him this dissertation would not have been possible. I am also grateful to for the important and measured advice of Chris Kyriacou. My deepest thanks are given to the school who participated in this study with a special mention given to the headteacher, children and adults who formed the basis of the work. A significant reference also goes out to the school's leader on ESD, whose consistent enthusiasm and support was a pleasure to have experienced.

I.   <u>Introduction</u>

The main aim of this research study is to investigate the following questions:

What do key stage 2 children know about the physiology, physiological needs and maintenance of trees in the urban environment?

What do children understand about how trees contribute to a sustainable environment?

How has the school's education for sustainable development contributed to the children's knowledge of trees and trees' contribution to sustainable development?

This research project aims to look at ways that the general population can gain knowledge and understanding on the needs of trees that grow side by side with us in our towns, cities and countryside. Specifically, the problem I perceive relates to the lack of understanding that the general public have on the below ground physiological structure of the tree roots and the critical rooting zone of the tree, which I call the root zone misconception. To attempt to educate the whole of the community who come into contact with trees would be a mammoth task needing enormous amounts of resources just to make a slight indentation on the situation. It could be considered that it would not be needed or justifiable to attempt to lobby such resources, however simple but effective planning for the future could go some way to achieving this by focusing on the compulsory education that all UK children must go through. This research masters sets out to try to understand what learning information concerning trees can be discovered through sustainable development education available for children through the National Curriculum. The introduction seeks to validate

the need to have a better understanding and to investigate some of the challenges I presently encounter during my working life as a Local Authority Arboriculture Officer.

In urban environments, trees have especially challenging conditions to allow them to provide their potential benefits. These challenges can arrive in the form of limited and poor rooting environments, pollutants, lack of suitable growing substrates, intentional and unintentional vandalism, artificial lighting, prolonged growing seasons, increased temperatures from sunlight and built up areas reflecting heat and damage both direct and indirect. One of the ways trees are damaged is by the destruction and or degradation of the soil and essential roots that provide the tree with anchorage, support and feed the upper canopy. The threats to trees are exacerbated by the general lack of public knowledge of the true physiology of trees and an understanding that whilst trees appear to be almost indestructible they are actually fragile living entities. As a tree and landscape planning officer for a local authority I am constantly facilitating knowledge to the local community and all stake holders of the requirements of trees in the form of the trees underground physiology as well as the above ground structure and the need to allow established thriving specimens adequate spatial requirements when new developments are planned near to them. Should this be fulfilled it could ensure no damaging activity occurs within the critical rooting zone to provide the trees with any chance of reaching their full potential.

When managing formal planning applications for development one of my roles is to ensure that existing landscape features that are worthy of retention and that are in the interests of the wider community are safely and sustainably retained. The largest natural landscape features I deal with are trees. Their longevity can run into hundreds of years and they can be irreversibly damaged in a matter of seconds if the appropriate care is not taken during the initial planning stage and later the development stage. The initial pressures on these

features are predominantly the development applicants or their agent wanting to maximise the land they have and gain the greatest financial return. Examples of this are that applicants wish to locate buildings close to trees with no consideration for the trees underground supporting system, its critical roots, its canopy of branches and its trunk, or permit it adequate space to continue its expansion in size as it grows over the years. It is a demanding and real challenge trying to produce a sustainable scheme that will safeguard a tree but could cost the land developer a figure that could run in to millions. The land available for development is a constant source of discussion and demand and accordingly the government has looked into this very closely.

Marked changes have occurred in planning regulations within the UK in the recent past to meet the ever increasing demand for development in the form of housing and commercial growth. The previous UK government was committed to increasing housing and that number of houses required was estimated to be at 240,000 new dwellings per annum. (Mortgage Guide UK)

The supply of this land has always been a huge challenge especially to green belts (Energy Saving Secrets, 2010) there are many people and organisations within our society who desire to retain the towns and cities with a "green fringe" and in practical terms most people would support it. However the expensive cost of land within Great Britain and the lack of suitable available land puts pressure on green belts and other sources of land. To try to provide adequate land to meet the challenge of the housing targets the government have looked towards brownfield sites to supply adequate alternative parcels of land for development.

One change to the planning regulations to safeguard what is perceived as green belt land has meant that land that had formerly been recognised as a dwellings garden could now be reclassified as previously developed land. This garden could now be subject to planning permission for the development of further housing. Another common term for this is brownfield site. Within the cited source it sets out what can be identified, described and classified as brownfield sites. It is not unusual for the term brownfield to immediately bring to mind sites that have previously been under industrial usage. However it can be described as:

> Brownfield site refers to land that has previously been used for any purpose
> and is no longer in use for that purpose. (Self Build ABC, 2010)

From the previous description it is clear that industrial sites can be used however should the site be desired to be used for housing then site investigations are required and remedial action should be taken if it is discovered that the land is contaminated in some way. Planning Policy Guidance Note 3: Housing published on 7 March 2000 set out the government's stance on developing brown field sites for housing and strongly encourage local authorities to build to higher densities of 30 – 50 houses per hectare but had to be constructed to better standards of design and in more sustainable locations. They went on further to inform that brownfield sites could include derelict houses or rundown buildings in the countryside and houses and gardens of which gives rise to concerns about the landscape features within them and specifically mature established trees with high amenity value. This has led to a significant rise in people selling off their back gardens for building plots or using the gardens of larger houses to attempt to gain planning permission for a new house / houses and in many instances where it is more profitable to knock down a complete

house and rebuild with 2 or 3 new houses. (Planning Policy Guidance 3: Housing (Cancelled) n.d)

Planning Policy Guidance 3 (Housing) was published on 27 March 2000 and replaced with Planning Policy Statement 3 Housing, released on 9 November 2006. This statement underpins the delivery of the Government's strategic housing policy objectives and it is the government's goal to ensure that everyone has the opportunity to live in a decent home, which they can afford in a community where they want to live. Within this document it included and set out a new definition for previously developed land and attempted to clarify its aims.

Section 40 states that a key objective is that Local Authorities should continue to make effective use of land by re-using land that has been previously developed. Under section 41, it further states the national annual target is that at least 60 per cent of new housing should be provided on previously developed land. This includes land and buildings that are vacant or derelict as well as land that is currently in use but which has potential for re-development. However it further went on to say that there is no presumption that land that is previously developed is not necessarily suitable for housing development nor that the whole curtilage should be developed. (Planning Policy Statement 3 (Housing) n.d.)

As noted from the above the new definition of previously developed land (brownfield sites) did not contradict the previous definition but did set out that not all of the land of any potential sites needs to be developed. This statement did reduce some of the pressures on the amenity trees that the community could enjoy that could be found there, it didn't however set out any specific support for them.

Planning Policy Statement 9: Biodiversity and Geological Conservation (PPS9) published 16 August 2005 sets out planning policies on protection of biodiversity and geological conservation through the planning system. This statement does offer some protection to trees that come in to conflict with development and states the following under section 10 Ancient woodlands and other important habitats.

> Aged or veteran trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided. Planning authorities should encourage the conservation of such trees as part of development proposals. (Planning Policy Statement 9: Biodiversity and Geological Conservation n.d.)

It was further advised that local authorities should proactively manage the land to be developed on previously developed sites to ensure that it is available, sustainable and achievable. (PPS 3. 54). This supports the requirement to ensure adequate and suitable trees and other landscape features or worthiness are retained and successfully integrated in to development schemes. (Planning Policy Statement 3 (Housing) n.d)

Despite the above policies there has been a perception that trees and green spaces in previously developed land where being lost. This has come to be known as garden grabbing.

The group Garden Organic, the national group for organic growing, were amongst a number of organizations and individuals who believed that the use of domestic gardens for brownfield sites for development was to the detriment to the urban environment and stated on their website the following:

Garden grabbing is a practice where property developers snap up large

detached houses, knock them down and then squeeze a small estate of new

homes onto the same plot. This erosion of Britain's green spaces is made

possible by a loophole in the law which sees gardens defined as brownfield

sites, making them ripe for development. (Garden Organic, 2010)

The government took the claims of this group and many others seriously and instructed

Kingston University to carry out independent research into the prevalence of the problem.

The results of the research were passed to Communities and Local Government's (CLG)

chief planner Steve Quartermain and he commented that,

Garden grabbing or inappropriate building on back gardens is not a widespread, national or

growing problem. A minority of authorities consider it to be of importance, mainly focused

in outer London and the South East, whereas the majority across the rest of the country

does not. The CLG did go on to say, However, we do feel that there is merit in reminding

local authorities that they already do have the means to address concerns where they exist,

and that this is an issue best identified and dealt with locally.

This was reported as, the main focus of the Government's position is that local authorities

are best placed to develop policies and take decisions on the most suitable locations for

housing and they can, if appropriate, resist development on existing gardens.

It was further reported that Planning Minister John Healey said:

Councils are leaving an open door for inappropriate development if they do

not have local plans in place, and the power to stop this lies in their hands.

Councils already have the tools they need to deal with this issue and this

evidence shows that when they have a local policy in place they can accurately judge the need for new homes on previously developed land, using their own discretion, and protect the essence of a neighbourhood. Planning Minister John Healey has reminded planning authorities in England that they have the powers to establish clear local policies that address inappropriate building on back gardens. (Milne, 2010)

Looking at the two local councils I am employed by, City of York and the East Riding of Yorkshire both have outdated policies when it comes to tree protection that are in desperate need of updating and whilst they do offer some protection they could be greatly enhanced should they be rewritten, reviewed or updated as advised By Planning Minister John Healey.

The policies are as follows:

City of York, York Development Control Local Plan

NE1. Trees, woodlands and hedgerows, which are of landscape, amenity, nature conservation or historical value, will be protected. (York Development Control Local Plan n.d.)

East Riding of Yorkshire. This Council was remodelled during the local government changes of 1996. The majority of the Council had been Humberside County Council; with five district Councils operating in the same area. In 1996 it became a unitary Council and still uses the planning policy from three of the five former districts (only within those districts they were adopted for). The other two districts have no tree policies.

Boothferry Borough Local Plan POLICY EN22

The local planning authority shall continue to protect important trees and woodlands where necessary through:

Imposing conditions on planning approvals

POLICY EN23 New buildings should be kept a reasonable distance from existing trees where possible, where the tree is covered by a preservation order.

POLICY EN25

The local planning authority will promote landscape improvement and the planting of trees in the plan area through:

Attaching tree planting conditions to planning permission and tree preservation order consents where appropriate.

East Yorkshire Borough Wide Local Plan

POLICY EN14 – LANDSCAPE FEATURES

Existing landscape features, which make a positive contribution to the environment, will be safeguarded.

Holderness District Wide Local Plan

POLICY Env2

When considering proposals for new development the Council will expect existing healthy trees and hedgerows to be retained so far as such retention is reasonably practical and will require additional planting using, where appropriate, native species, as an integral part of the scheme or in the immediate locality.

POLICY Env3

The Council will use its powers to make Tree preservation Orders to protect trees in the interest of amenity where the trees have amenity value, which is considered worthy of protection in the long term.

Recent changes to the permitted development rights within the UK allows more development to take place within the domestic property (e.g. adding on conservatories) without the requirement for planning permission to be granted by the local authorities. (Common Projects Extensions 2010) These changes to planning regulations came into force in England on 1 October 2008 and where described by Guilford Borough Council as been the most significant for a generation. The changes to permitted development legislation would allow householders to construct a wider range of certain types of extensions, additions and improvements without the need for a planning application. The new process aimed to make planning simpler for householders and reduce the number of householder applications, giving planning officers more time to consider more complex planning applications. (Guildford Borough Council 2010)

The problem that occurs here is that they may be trees with significant community amenity value presently growing within these areas and subsequently now have no requirement to safeguard them from any potentially damaging works or felling. The change in planning regulations did not just included houses but included flats and maisonettes. These changes have meant that more and more trees are being lost or put under threat by inappropriate development close to them, damaging their rooting zones and leaving them with inadequate space to grow or by simply felling them.

A. The Eight Doorways

The web site teachernet has provided information on the sustainable development perspective in an educational setting and divided it in to the eight doorways (Teachernet, 2009)

They inform:

> The 'doorways' (sustainability themes), of which there are eight, are discrete entry points or places where schools can establish or develop their sustainability practices. Each of the doorways draws its inspiration from a range of Government policies concerning sustainable development and quality of life. There are opportunities and recommendations for schools in relation to each of the doorways. (Teachernet, 2009)

Examining the eight doorways and how they relate to trees the following provides an example of them.

i.   <u>Food and Drink</u>

On a local native scale there are many fruits that trees provide: apples, pears, hazel nuts cherries and damsons to name but some. The benefits they provide are well documented, not only reducing the carbon footprint, (Home of Carbon Management 2010) but also economically by providing local employment opportunities in rural areas where work can be scarce (about.com n.d.)

Trees can help to provide better quality water by the process of helping to slow down the filtration of water from its source of depositing before it arrives at its processing place. This facilitates the reduction of impurities at the processing plant so reducing costs and energy in processing it for the end product of clean healthy drinkable water. (Suite101.com n.d.)

ii.   Energy and Water

Trees provide a renewable source of energy. If they are harvested for wood burners etc they are described as being carbon neutral, because the carbon that is being released has only just been stored there, in comparison to coal, gas or oil which has been stored over a long time period and released over a short period of time. (Fern n.d) It is noticeable that York City Council has a number of wood pellet boilers including the ones at Danesgate Skills Centre, Acomb Library and York High School as part of its strategy for meeting challenging carbon emissions targets (Heating and Ventaliting.com n.d.)

The recent heavy rain falls the UK has seen during the summer months, the most recent of which hit Cockermouth in Cumbria (BBC 2009), have shown how devastating they can be on the local communities they affect, with the loss of lives, businesses, homes and the disturbance to every day life and local economies. This has led to understandable calls to reduce the problem.   It has been suggested that there is no one way to try to achieve the reduction of these events, however trees can play a valuable part of an integrated approach to the problem. This also has the multi benefits of stopping soil erosion, sediment depositing in built up areas and in to the sea, thus allowing the water to be used locally at its source of falling. (Journey to Forever n.d.)

iii.   Travel and Traffic

As of yet no efficient wood burning domestic vehicle has been produced. However travel and traffic are under the influence of trees. The emissions given off by the burning of fossil fuels is absorbed by trees (Colorado Tree Coalition n.d.) There has also been research and noticeable claims that driving in green and pleasant environments that contain trees helps to

19

reduce stress levels which in turn help people to drive in a more passive manner and help them reduce the energy the vehicles use. (Monash University 2009)

iv.   Purchasing and Waste

Many products used in schools can be made from wood pulp including paper. Wood pulp is a system that recycles used various products made from wood as well as the usage of trees grown in monocultures for the wood markets. The production of wood pulp uses 24% of imported wood to the UK (The British Wood Pulp Association 2010). It would be far more sustainable if the trees supplied for wood pulp where supplied from local sources. The reeducation of using paper and recycling of used paper in schools would reduce the need to import wood for wood pulp.

v.   Inclusion and Participation

Schools can promote community cohesion by providing an inclusive, welcoming atmosphere that values everyone's participation and contributions should they plant trees within their grounds and encourage the wider community to be involved with the process. (London Borough of Hackney 2008)

vi.   Buildings and Grounds

The planting of trees in school grounds as screens and shelter can reduce the costs of heating as trees can reduce the requirement for energy use for heating and cooling by protecting them from the extremes of weather. (bobvila.com 2010)

These trees would also if planted provide increased bio diversity within the grounds and would encourage a more varied learning experience for the users of schools, they would bring pupils closer to the natural world, capturing their imaginations in outdoor play, and

help them learn about sustainable living. (Shade Trees and Biodiversity in the Urban Environment n.d.)

vii.   Local Well Being

The planting of trees within school grounds with the participation of the wider community can provide local well being and a sense of belonging to that community which engenders community responsibility and pride. (Green Tree Community Health Foundation n.d.)

viii.   Global Dimensions

When considering sustainability from a global prospective, trees are never far from the forefront of conversation. The destruction of the rainforests around the planet is well documented and the devastating effect it has had on local comminutes and bio diversity is well known. (Raintree Nutrition n.d.) Linking this to the specific schools and allowing an understanding of trees physiology and requirements would facilitate a better understanding of the protection required for the benefit of the whole planet.

This research will carry out its work by going to a school and supplying a questionnaire to year 3 / 4 children. Focus groups will then be set up which cover the children who answered the questionnaire and one with the adults who participate in the children's learning. A practical Action Research session will also be undertaken to plant a tree with the children. The research questions for this work are:

> What do key stage 2 children know about the physiology, physiological needs and maintenance of trees in the urban environment?

What do children understand about how trees contribute to a sustainable environment?

How has the school's education for sustainable development contributed to the children's knowledge of trees and trees' contribution to sustainable development?

II. Literature Review

Outline of the Growth of Education for Sustainable Development in the UK

Education for sustainable development (ESD) has its roots in the 1970/80's when growing concerns for global warming and the world living an unsustainable lifestyle gathered international concern, Huckle (2008). The 1992 United Nations Conference on Environment and Development, (UNESCO 1992), also known as the Earth Summit in Rio de Janeiro was unmatched at that time as an approach to environmental issues and sustainable development. Opening the conference Maurice Strong commented,

"If we don't change, our species will not survive. Frankly, we may get to the point where the only way of saving the world will be for industrial civilization to collapse." (Wikiquote, 2011, p1)

After the summit several documents and guidelines were circulated for governments concerning global change. These documents where described by Strong (1992) as a historic moment for mankind because they set out a course of action that could provide a suitable future for the planet.

One of the main documents to come from the Earth Summit was Agenda 21 (Wikipedia, 2011). This laid down an action plan for global, national and local communities where activities were affecting the environment. Chapter 36, Promoting Education Public Awareness and Training, distinctively deals with education and sustainability issues. The report argues that,

The core themes of education for sustainability include lifelong learning, interdisciplinary education partnerships, multicultural education and

empowerment...Special attention should also be paid to the training of
teachers, youth leaders and other educators...Even in countries with strong
education systems, there is a need to reorient education awareness and
training so as to promote widespread public understanding, critical analysis
and support for sustainable development.(United Nations Agenda 21, 1992,
Chapter 36)

In 1997 the Kyoto Protocol issued a requirement that tied all its members to a commitment
to the reduction of greenhouse gases (Wikipedia, 2011). In the UK in 1998 the government
set up the Sustainable Development Education Panel (SDEP), an advisory non departmental
public body (NDPB) that was tasked to cover schools, further and higher education bodies
and education in work, recreation and the home. Their task was to consider how these
organizations (and in this case schools) could address ESD. Amongst their aims was to
ensure young people obtain the knowledge and skills to be active citizens for the new
millennium (Education for Sustainable Development in the National Curriculum, n.d.)

Seven key ESD concepts were devised from the above.

Interdependence

Understanding the connections and links between all aspects of our lives
and those of other people and places at a local and global level.
Understanding that decisions taken in one place affect what happens
elsewhere.

Citizenship and stewardship

Recognising that we have rights and responsibilities to participate in decision-making, and that everyone should have a say in what happens in the future.

Needs and rights of future generations

Learning how we can lead lives that consider the rights and needs of others. Understanding that what we do now has implications for what life will be like in the future.

Diversity

Understanding the importance and value of diversity in our lives culturally, socially, economically and biologically. Understanding that all our lives are impoverished without this.

Quality of life

Recognising that for any development to be sustainable it must benefit people in an equitable way. It is about improving everybody's lives.

Sustainable change

Understanding that there is a limit to the way in which the world, particularly the richer countries, can develop. Understanding that the consequences of unmanaged and unsustainable growth are increased poverty and hardship, and the degradation of the environment to the disadvantage of all.

Uncertainty and precaution

Realising that as we are learning all the time and our actions may have unforeseen consequences, we should adopt a cautious approach to the welfare of the planet.

In 2000 the national curriculum was revised and it acknowledged the work of the panel and the profile of ESD and made it a statutory obligation in science, design and technology, geography, citizenship and opportunities were recognized across the whole curriculum. Promotion of the following was also required in schools,

awareness and understanding of and respect for the environment in which they live, and secure their commitment to sustainable development on a personal, national and global level. (The National Curriculum: Handbook for Primary Teachers in England, 1999)

In 2002 The Qualifications and Curriculum Authority (QCA) started to construct curriculum direction for schools where each of these key concepts was explained. Education for Sustainable Development in the National Curriculum (u d)

April 2002 through to March 2003 saw OFSTED visit 14 primary, 2 middle and 10 secondary schools to identify good characteristics of ESD practice. The main findings where,

ESD has clear links with a number of subjects where opportunities for its development are presented in National Curriculum programmes of study, notably in geography, science, design and technology, citizenship and personal, social and health education (PSHE). (Ofsted Publications and Reports, 2003, p5)

It further went on to report that although there is room for improvement the embedment of ESD by the successful schools had achieved more than the required curriculum areas which had been made mandatory.

Learning to Last was produced in 2003 which set out the government's long term aims for ESD. It was the conclusion of the work created by SDEP and it covered all aspects of education. The statutory education system was given the key objective to ensure schools have

> the professional capacity and the resources to develop knowledge, skills and
>
> aptitudes that enable all citizens to engage in the achievement of sustainable
>
> development. (Education for Sustainable Development in the National
>
> Curriculum, n.d., p1)

The United Nations declared that the period 2005 – 2014 was to be the decade of Education for Sustainable Development. The aim of this is for, UNESCO to be the lead agency and,

seek to integrate the principles, values, and practices of sustainable development into all aspects of education and learning, in order to address the social, economic, cultural and environmental problems we face in the 21st century .(UNESCO Education for Sustainable Development, 1995-2010, p1)

The academic year 2006/7 it was named the year of action on sustainable development for schools by DfES. This year also saw the launch of the sustainable schools programme which should be achieved by 2010. This saw the beginning of the eight doorways to sustainability. These doorways of a sustainability theme are points where schools can establish and develop their sustainability practice. The doorways draw their inspiration

from government policies ranging from the quality of life through to sustainable development. Recommendations and opportunities related to each of the eight doorways are found and each plays a role in the curriculum and campus, but can also have a big impact on the whole community. (Teachernet, 2009). They are as follows:

Food and drink

An unhealthy diet contributes to obesity and poor pupil concentration. Healthy, ethically sourced food can offer nutritional benefits while protecting the environment and supporting local producers and suppliers.

Energy and water

Rising demand for energy and water is storing up problems for future generations. Energy efficiency, renewable energy and water conservation can tackle this problem while saving the school money.

Travel and traffic

Rising vehicle use adds to congestion, road accidents and pollution, including carbon emissions. Car-sharing and public transportation help to ease these concerns, while walking and cycling also boost fitness and well-being.

Purchasing and waste

Waste, and the throw-away culture that encourages it, can be addressed through sustainable consumption. Schools can reduce costs and support markets for ethical goods and services at the same time.

Buildings and grounds

The way school buildings are designed, constructed and managed affects their ability to 'teach' pupils about sustainable living. For example, decisions over materials and equipment provide opportunities to highlight sustainable practices, while the inclusion of food-growing, biodiversity conservation and natural play in grounds increases their learning value.

Inclusion and participation

Schools can promote community cohesion by providing an inclusive, welcoming atmosphere that values everyone's participation and contributions – irrespective of background, culture, age, religion or ability – and challenges prejudice and injustice in all its forms.

Local well-being

With their central locations, facilities and extensive networks, schools can act as hubs of learning and change in their local communities. Problems on their doorstep offer relevant and engaging opportunities for pupils to learn, and a means of strengthening local relationships. (Teachernet, 2009)

Global dimension

Growing interdependence between countries changes the way we view the world and ourselves. Schools can respond by developing a responsible, international outlook among their young people, based on an appreciation of the impact of their lives on global challenges, and understanding of other cultures. Teachernet (2009)

The OFSTED Annual Report of Her Majesty's Chief Inspector of Education, Children's Services and Skills (2009/10) informed that this year the context has changed significantly in terms of the report's findings. It commented that the global economic down turn is being felt across all sectors but perhaps most so by young people leaving schools and entering the job market for the first time. It further went on to say in the Learning and Skills section,

Science and mathematics was one of the least positively judged sector subject areas in colleges inspected this year. This is a concern because of the particular importance of this sector subject area for economic competitiveness. (OFSTED, 2010, Main Summary, p4)

This can be seen as alarming to ESD, as no mention of SD is seen and conclusions could be made that it now is no longer a need or a requirement.

The report on Education for Sustainable Development in the UK in September 2010 produced and Published by the National Commission for UNESCO commented on ESD in the UK, a consultation which many stakeholders contributed to and covered the periods April 2008 to April 2010. It reported that ESD continues to gain impetus as an important emerging field of educational policy, practice and research. There have also been signs of increased progress of embedding developing practice and policies across a wide range of sectors across the UK. Evaluating practice appears to be in its infancy in terms of assessing the force of national policy on learning and teaching across all education. A key element of ESD appears to have gained momentum on achieving learning and awareness in the UK concerning action about climate change. This can in part be linked to the establishment of strong government policies in 2008 on climate change and the taking part in 2008 and 2009 with international conferences concerning the same subject. It was also reported that it was a consequence of public information being supplied through the media and advertising. In

the UK we are also seeing wider support from stakeholders and actors in a wider environment or development sense, however it is felt that there could be danger that attention will be marginalized by the carbon reduction agenda that is at present impacting on schools, colleges and universities if not yet on the whole of civil society. (Education for Sustainable Development in the UK, 2010).

A. Recent theoretical developments

Vare and Scott (2007) commented upon the ideas behind ESD and argue it is necessary now to think of two complementary approaches: ESD 1 and ESD 2. They informed, they saw ESD 1 as the promotion of skilled and learned behaviours and ways of thinking that are useful in the short term where the requirement is plainly identified and agreed. ESD2 would be seen as a building capacity to think critically about what experts say and to test those ideas investigating the dilemmas and contradictions inherent in sustainable living. They noted the policy maker's approach, which was appreciative of ESD1, however this rational call to change behaviour rarely is successful and too much achievement in isolation would make our capacity to manage ourselves less sustainable. They argued that ESD2 is needed to compliment ESD1, making it meaningful in a learning sense.

Elshof (2009) analyses the unsustainable manner that we as a species have been living. It draws comparisons from a satirical movie, The Age of Stupid. In this movie we see a society living beyond their financial means, consuming heavily and leaving a trail of over usage of resources. The paper investigates the importance of 'disclosing' political ideologies, poor curriculum and junk science relating to technologies and science education. It concludes that the industry of technology education for all has failed and slipped back in supplying an educational resource of critical ethical thinking about social

cultural and ethical dimensions of sustainability. It appears to have been too pre occupied in equipping young people with 'industry standards'. He further states that it is,

an opportune time for progressive teachers, researchers and curriculum administrators to re-imagine technological education and in the process green the technology education curriculum from top to bottom.

Similarly Huckle (2009) wrote an article concerning the requirement for all schools to become sustainable by 2020 announced by the government. He suggested that geography teachers should enable students to think critically concerning sustainability and to make informed choices about school and the wider world.

The global economic downturn and the effect on the world economy and sustainable development were commented on by Huckle (2010). He argues that a more critical form of ESD is needed, linked to global citizenship. He makes this claim with reference to the Green New Deals being of limited effect on the financial stimulus packages being offered. He argues that the G20 summit of 2009 which supported financial stimulus packages around the world could be seen as supportive of the Global Green New Deal or Green Economy Initiative proposed by United Nations Environment Programme (2009) however he commented, " it is long on generalities but short on environmental specific policies." (p137)

B. Other Relevant Research Literature

i. <u>Why it's good to learn about environmental issues at an early age</u>

Rovira (2000) researched the effects of a local government programme on environmental education (Programa Integral d'Educació Ambiental de Cornellà PIDEAC—Global

Environmental Education Programme of Cornellà) in Catalonia, whose aim was to change the habits of the local population. He argued that his results had shown that the common understanding of environmental education has actually changed in the local population. He further went on to state that if habits are considered in forming environmental awareness then primary school children are the most conscious.

ii. Reasons to view learning by drawings

Bowker (2007) presented a paper that studied the drawings that had been prepared by a group of 9-11 year olds pre and post visiting the Humid Tropics Biome at the Eden Project, Cornwall, UK. The children's perceptions before visiting illustrated a rural landscape similar to one you would expect in the England, with the inclusion of rainforest animals which appeared with a general lack of scale, depth and perspective. The post-visit drawings in the most part showed a significant reduction of rainforest animals and often a remarkable accuracy in the detail and shape of the tropical plants that had been witnessed. Bowker claimed that this gave an insight into the children's understanding and learning about tropical forests and provided an effective method of assessing some aspects of their learning by the analysis of their drawings.

Myers et al (2004) also used drawings to interpret children's understanding of animals. They interviewed 171 children aged 4 to 14 years and asked them to draw their favourite animal. The study explored changes in children's conception by age and how they can change by age. The studiy's aims were to understand how children think about animals with the desire to bridge this to how they care about the environments they are native to and the environment more generally.

iii.   <u>Learning in Green Environments</u>

Ballantyne and Packer (2008) wrote a paper concerning the topic of introducing a fifth pedagogy, an experience based strategy for facilitating strategies in natural environments. They carried out observations and in-depth interviews with students, class room teachers and centre teachers who had participated in 12 environmental education programmes and used the data to identify the strategies that are most effective in facilitating learning in a natural environment. The 199 school children ranged from 10 to 17 years old. Ballantyne and Packer concluded that experience based learning is particularly important in dealing with environmental actions and attitudes, and stated the following,

> Modes of delivery that relied on experience based learning actively engage students to a greater extent than teacher directed methods... Students attribute more of what they remember from an environmental field excursion to experience based learning than teacher directed methods.

> The outcomes of experience based learning are more enduring than the outcomes of teacher directed learning... Experienced based learning is particularly important in facilitating attitudinal and behavioural changes.
> (p260)

Malone (2004) Argued that in the 21st Century, when children will grow up more and more in overcrowded, unsafe and polluted environments that provide limited opportunity for natural play and environmental learning, that there is value to botanical gardens and other green spaces in cities that are 'holding environments' for children's environmental learning. The author further goes on to argue that there is a need for children to use these spaces so

they can connect, engage and respond to nature so enabling them to participate and contribute to global sustainability.

Fisman (2005) presented an article on 3rd and 5th graders who participated in the Open Spaces Learning Places Programme, an urban environmental programme on children's awareness of their local biophysical environment. The results showed significant positive effect on the awareness of the local environment and on knowledge of environmental concepts had been gained by the children. Improvements in environmental knowledge were uncorrelated with the children's socioeconomic status, whereas improvements in local environmental awareness appeared only among students living in high socioeconomic neighbourhoods.

iv. <u>Reasons why it would be beneficial to include knowledgeable environmental educators</u>

Devine-Wright et al (2004) carried out research to explore children's beliefs about global warming and energy sources focusing on situational influences upon subjective beliefs. Empirical research was carried out on adults and children aged 9-12 to explore the influence of a cooperative learning environment. The group involved were the Woodcraft Folk educational organization set against that of a sample group of children who did not belong to the organization. The results discovered where that cooperative learning can have a significant and positive effect upon children's beliefs. The woodcraft group also showed significant levels of personal awareness about large scale environmental problems.

v.   <u>Lack of integration</u>

It is widely accepted that integration and embedding of SD into the subject areas within the curriculum is a successful way of learning and advice on how to achieve this is widely available. The Environmental Association for Universities and Colleges (ud). The following research papers provide examples on research that has analysed integration or the lack of integration of ESD.

Littledyke (2004) Interviewed children from seven different year groups in a primary school in groups of three or four to find out their level of understanding on issues related to the environment and science. The large majority exhibited concerned understanding about environmental issues drawn from school and their out of school influences, though the remaining groups showed limited knowledge or contradicted understanding. The science knowledge appeared to have been attained from the school teachings however they had little understanding of the impact of science on society or the environment.

Loughland et al (2003) carried out research work concerning environmental education in schools as an important strategy in achieving environmental protection and improvement. They informed this needed to be based on children's understanding of environment rather than on the assumptions of what children believe and know. In a previous article wrote by Loughland et al (2002) they reported the results to open ended questions to the word environment. Analysis of the different ways in which people (in this case the schoolchildren) experience something or think about something were recorded. An important difference was found between conceptions that treat the environment as a relation and those that treat it as an object. They further went on to argue that the development of the former appeared to be an important aim of environmental education and they indicated

how this may be achieved. One way they put forward of achieving this was to have a more integrated curriculum that cuts across disciplines. They also argued that industry partners could take a lead on environmental education as they all provided policy for environmental education. They also raised the possibilities of taking the education out of the classroom and locate it in the environment where the young people lived.

Ali (2002) argues in his research in Kenya looking into factors affecting children's ideas about parks and wildlife that educationalist and conservationist had kept their disciplines and professions apart and this had lead to a lack of responsible environmental behaviour. Educationalist believed that their role was to teach in the classroom and schools, conservationists were concerned only with the wildlife and parks as a major concern that had little to do with children.

   vi.   <u>Benefits of Learning outside the Classroom</u>

O'Brien (2009) observed children from three counties located in the south west of England who were involved with learning in Forest Schools. She informed that there were then 140 forest schools in the UK, 20 in each of Scotland and Wales,the rest in England and that the concept was growing. The children who attended these Forest Schools did so regularly over extended periods of time, allowing them to have contact and become familiar with a natural environment. The benefits observed and recorded by teachers and Forest School leaders were as follows; the children gained physical, language, and communication skills as well as improvements in motivation, concentration and their confidence. These changes took time to occur, which she believed required regular and repeated contact with the natural environment in question. This was particularly highlighted with children who did not have the opportunity to interact with nature as part of their usual daily lives.

Hoffman, Morales & Wallach (2007) Commented on the numerous articles based on the impacts of community based work, self esteem, self efficacy, gardening and environmental education. They further reported that empirical data had suggested that a sense of interdependency and loyalty had been created to the institute by students and groups who had become involved in works to improve schools. Their article's purpose was to illustrate that gardening programmes help to improve self esteem and to reduce ethnocentrism among community college students. The added benefit of the work also showed an increase in community involvement and awareness. The results they claimed were that when a learning institution has programmes such as a campus gardening initiative, a sense of positive self empowerment and interdependency develops between faculty and students.

Qualters (2010) informs that experiential education can be a powerful learning experience that benefits not only the student but the faculty, staff, administrators and the community as well. The author claims that it is truly authentic education as it assists in the translating of knowledge gained in the classroom into learning that is meaningful for their future. This type of learning needs to be viewed as a form of pedagogy that is unique, requiring deep reflection, assessment and collaboration. It further is contended that unless experiences outside of the classroom are integrated within the classroom with goals and objectives of the discipline theory, learners will not have quality experiences and will not connect with them in the classroom. Reflective experiential education programmes are required if transformation of a valuable opportunity within the classroom is to be realised. This would provide a community learning that would be a deeper understanding of the world. The cornerstone of authentic understanding how theory and practice meet to create new ideas and ways of knowing are a common thread of the coming together of practice and theory, so providing the learner with significant value, which helps students become independent.

C. Policy Comment

Bonnett (2003) reviewed some of the problems with taking the notion of sustainable development as a policy and called it a frame of mind. Central to this interpretation of sustainability are the notions of a right relationship with nature, conditions and our own sense of identity and our attitudes towards the environment. If this interpretation is not correctly understood or defined then any attempt at producing meaningful policy will be lost. Bonnett finally stated that if learning is to promote sustainability as a frame of mind it needs to be located in a practical way so we do not lose our sense of intimate connection with it.

Huckle (2008) argued that New Labours policy for ESD had intrinsic contradictions based on the growth of business schools in opposition to grammar schools. In business schools, more instrumental curriculum gives greater attention to basic skills and testing and less to creativity and critical thinking.

He also goes on to argue that there are four main reasons why ESD was not providing adequate SD education. The first was that attention to individual attainment and competition in education coupled with the erosion of the principles of comprehensive schooling discourages the principal of caring, in this case for one's self, each other and the environment on which the eight doorway framework is based. This doorways approach on which to build a sustainable school suffered by this business school approach by the erosion of local community schools and by closing the doorways of participation and inclusion, local well-being, and travel and transport. Examples given to support this where statistical information concerning the increase in car travel distance to school.

Secondly, increasing privatization of services to schools, like catering, will mean it is less likely to provide healthy meals and meet high environmental standards. Also, the then government's buildings schools for the future programme (BSF) (now dropped by the present government) encouraged the unsustainable borrowing met by the tax payer. It was suggested that the schools had the potential to create a generation of advanced, eco-efficient school designs and that new build and refurbishment projects should rate at least 'very good' using the Building Research Establishment's environment assessment method. However the commission for architecture and the build environment reported that 50% of the new schools, built between 2000 and 2006, were poorly designed and built, and that 9 out of 10 of the worst designed new schools were built and were to be paid back by the tax payer. Other comments argued about the BSF included that they were, behind schedule, lacked expertise, schemes were reluctant to experiment with designs of an ecological nature and that these aims could only be raised by reviving municipal socialism and removing the financial and ideological shackles binding local government.

Thirdly the national curriculum produces academic diversions therefore marginalising the theme of ESD. This makes it difficult for learners to understand the complex interactions between social studies and bio physical. Critical ideas from subjects such as politics, sociology and economics do not feature in lessons for the majority of learners. This has been further compounded by the decline of project work and environment & community based enquiry. Therefore learners rarely experience the ways of producing, organising and validating knowledge associated with the participatory left.

Lastly unhelpful guidance on ESD is often found which fails to confirm the reality of the contested nature of politics and SD.

D. Moving on from ESD

Webster & Johnson (2008) argue that ESD is at its light green stage, informing on issues such as reducing waste and consuming intelligently. This needs to be moved on to something more inspirational that focuses on big systemic change – a bright green stage. These changes can be seen at present in innovative business practice, in fields as diverse as city planning, agriculture, forestry, construction and product design that are adopting a 'closed loop' (living systems) model. This closed loop system is a way that produces no waste and everything that is produced can be reused or recycled. The authors inform that their publication can aid education, colleges and communities with ESD by placing it at the heart of all they do by 'bright green thinking' – just as it has done for leading businesses like General Electric, Toyota and Interface FLOR .

In their book they argue the case for another framework of thinking: 'Nature as Teacher, Nature as Capital'. They go on to explain that most of the earth's natural ecosystems are driven by the Sun. In nature, 'waste=food'. Natural systems are abundant and self-sustaining. In healthy ecosystems cooperation (participation) and competition usually go together. Everything connects and is a closed loop. This is a circular feedback mechanism which helps to ensure continuity and a dynamic balance in the system. Using the 'Nature as teacher' framework of thinking, industrial systems and products are designed and developed to mimic Nature– this is driven mainly by renewable energy sources and mimics the closed loops of natural ecosystems. Industrial products are designed in what has been named a 'cradle to cradle' process. What end goods cannot be composted (e.g. metals) go back to industry in a closed loop– as a valuable, easy to manage 'nutrient'. Waste is designed out using natural systems for inspiration. Education for sustainability becomes the debate around how the insights of Nature can be best applied unambiguously to a modern

world in evolution and to the processes of learning itself, which is also based on participation and feedback.

E. Conclusion

The change in people's awareness and the political support for a more sustainable approach to life started back in the 70's and 80's and has continued through to the present day at a pace which is considered by many to have not gained as much support as required. The national curriculum has made advancements in supporting the education of sustainability in schools first through the key concepts of ESD and later through the eight doorways to sustainability. The definition of SD for policy has been questioned and arguments raised that New Labours policy has failed due to a business approach to schools. Research work has also reported the importance of analysing integrated ESD in schools and with school age children and has reported many ways in which learning can be enhanced for better knowledge and understanding. However the recent global economic down turn could over shadowed and even leave behind the progress that has been made unless governments around the globe use this present opportunity to build a more sustainable approach to economic development. There have been developments to demonstrate that learning in green environments has benefits to both the individual and the community. ESD learning now needs to move on to a new level of critical thinking and by using a closed loop approach. Finally a new approach to further ESD has been suggested, Closed Loop Thinking, which would take ESD to a new and more appropriate level.

III. <u>Methodology</u>

A. Main Aim and Research Questions

The main aim of this research study is to investigate the following questions:

What do key stage 2 children know about the physiology, physiological needs and maintenance of trees in the urban environment?

What do children understand about how trees contribute to a sustainable environment?

How has the school's education for sustainable development contributed to the children's knowledge of trees and trees' contribution to sustainable development?

B. Qualitative Data Approach

In collecting data for this research it was decided that a qualitative approach would be most suitable. This would look deeper by analyzing remarks and comments by recording attitudes, feelings and behaviours. It would further encourage people to expand on their responses so they could open up new topic areas not initially considered. A detailed picture could then be built up about why people act in certain ways and their feelings about these actions could be shown. As it was used alongside quantitative data collection, it could also explain why a particular response was given.

Leading from the above decision it was decided that a case study approach would be beneficial for this research because it is a source of ideas about behaviour, providing opportunities for innovation. It is a method to study rare phenomena which provides a method to challenge theoretical assumptions, allowing the research of children's knowledge concerning trees by using a small population which could provide insights into the potential wider populace.

 Denscombe (2007) informs that the logic of concentrating on one case as an alternative to many is that insights may be gained from looking at this single case which may have implications for the wider population. He also says that these insights may not have come to light had a survey approach been used for a wider group. "The aim is to illuminate the general by looking at the particular" (p36).

Bell (2005) reports that, "Though observations and interviews are most frequently used, no method is excluded" (p10).

This case study utilised semi-structured interviews and questionnaires to provide quantitative results.

It could be suggested that the research this author has undertaken could in part be classified and considered as action research. This is especially true when looking at the practical session undertaken by the researcher with the children planting a tree. Not only did we plant a tree but we listened to the children's ideas of how it should be carried out, demonstrated the most appropriate way to do it and then carried it out as a group.

Cohen et al (2007) highlights the strengths of case study as, Results are more easily understood by a non academic audience as frequently they are written in non professional

language, they are intelligible immediately as they speak for them self's, unique features are caught that can be lost in large scale data (e.g. surveys) this features can hold a unique key to help understand the situation, reality is strong with them, insight is provided into other similar situations and cases which help to assist interpretation of similar cases, a single researcher can undertake them without the need for the support of a full team of researchers, unanticipated events and variables can be embraced.

Denscombe (2007) also states advantages of case studies are that the main benefit is to focus on one or a few instances allowing subtleties and intricacies of complex social situations to be dealt with by the researcher, allows a variety of methods to be used, and encourages the use of multiple methods of data capture, so fostering the use of multiple sources of data to provide triangulation and validation. This is particularly suitable where little power over events is dictated by the researcher and this complements the fact that the researcher is under no pressure to impose controls so is able to report phenomena as they naturally occur.

There are documented examples of weaknesses of case studies and Cohen et al (2007) highlights some of them by saying, results may not always be generalizable except where other readers and researchers can see their application and cross checking is difficult as they are not always open to it so they could be subjective, personal or biased.

Denscombe (2007) also provides the following weaknesses of case studies as, gaining access can be demanding and can cause the research to flounder, can cause ethical problems in terms of confidentiality, their presence can cause effects to the research including over time the observer effect and the also the researchers presence can change the responses of those being researched.

Dealing with the above weaknesses, the resercher had over two years of contact with the school in question and carried out environmental exercises with them, so building up a strong, confidential relationship where access was easily achieved. It was however the first contact with the group participating in the research. The initial interaction with the children was to carry out the questionnaire, which was delivered to the whole class by their teacher and the researcher, followed with a practical tree planting exercise, and then recapping of their knowledge and understanding using a mind map. This enabled the second highlighted point, "under the microscope" and "being observed in some way" to be dealt with as they became familiar enough to feel relaxed and not threatened by the researcher's presence. This approach also helped with the focus group interviews, as the researcher became familiar to the children due to the previous activities carried out with them.

C. The Questionnaire

The main aim was to understand if the children know the main parts of a tree. It was expected that most children would know the upper parts of a tree but would have less understanding of the roots and their orientation and the specific environment they grow in.

It was decided that the most informative way to approach this work would be to provide initially a questionnaire with expected statement answers but also have elements of this questionnaire delivered in a structured manner to produce simple A, B, or C, answers to 3 questions. This approach would provide quantitative data. This would provide and identify any knowledge the children held in a fairly superficial way. This superficial knowledge shown on the questionnaire was easy to identify as it consisted of short answers with no explanation provided in many cases.

The expected statement highlighted above was a view taken by the researcher after conversation with the class teacher. This was achieved by using knowledge and understanding of the general likely level of knowledge and understanding the children may have about the subject matter.

The questionnaire was administered to the children by initially talking about and explaining each individual question to follow. It was considered by the researcher and the class's teacher that this would produce the most relevant data. The questions were shown on an interactive white board one at a time, after which the children had the opportunity to discuss the question with their class mates, teaching assistants, teacher and the researcher should they wish to.

Denscombe (2007) provides the following reasons why it is appropriate to use questionnaires with reference to this particular situation, when what is required tends to be straight forward and brief and uncontroversial, when open and honest answers are expected, when standardised data from identical questions are required without face to face interactions and when respondents are expected to be able to read and understand the questions.

He further goes on to provide the following advantages of questionnaires, as they supply standardised answers, the data is unlikely to be contaminated through variations in wording or the manner in which questions are asked or if they are pre coded, however pre coded answers encourage and provide data that is likely to fit in to a range of options offered by the researcher, thus allowing for quick analysis of the data.

Denscombe (2007) points out that, when drawing questionnaires up it was important that they need to be concise ensuring that the questions raised are crucial to the research only.

To provide this a clear vision of the issues at the heart of the research and what would provide information on these issues. To ensure this was achieved the researcher conceded broader points that influenced the direction and style of the questions. These included, could direct questions be asked or could indirect questions provide the measures. Similarly could structured, semi-structured and unstructured, closed or opened questions provide the data needed.

It was decided that direct questions would provide the best results as the children would not find them annoying or irritating and be willing to voluntary answer using the knowledge they had gained from school and the wider environment on sustainability. It is also noteworthy that there were to be two types of approaches to the data collection for the questionnaire. One with fixed choice answers and the other with open ended answers. This was considered by the researcher after discussions with the class teacher that it would provide more in depth answers.

A list of questions were then drawn up ensuring they were produced using wording supplied at an appropriate level which would lead to the desired outcomes. This was level of wording was decided by the researcher after discussions with the class teacher as to what would be appropriate for this level of school child to easily understand. These questions included answering by the drawing of pictures as well as providing written responses. These needed to be piloted first to ensure that they were being delivered in language that could be understood by the children. The piloting of the questions was carried out by trialling it on a group of children at the same school as the one in question. This was done using children from the sister group of the class to be used in the research, (there are two year 3 / 4 classes who are taught by the same teachers who share the preparation of the

class learning planning). They were interviewed in the same manner as the subjects in the research, ensuring they were relaxed and felt non-threatened.

Bell (2005) comments,

"All data gathering instruments should be piloted to test how long it takes recipients to complete them, to check that all questions and instructions are clear and to enable you to remove any items which do not yield useable data ... The purpose of a pilot exercise is to get the bugs out of the instrument so that respondents in your main study will experience no problems in completing it. It also enables you to complete a preliminary analysis to see whether the wording and format of questions will present any difficulties when the main data are analysed" (p147)

Denscombe (2007) informs there are four basic criteria for evaluating a research questionnaire. These are: will it provide full particular information on the research topic, will accurate information be provided on the questionnaire, will evaluation of it provide a reasonable response rate and it needs an ethical stance to ensure the information supplied will be treated in accordance with strict professional standards.

Once the initial questionnaire was completed by the children, it was decided by the researcher that the answers lacked significant depth and that some answers could be expanded upon to provide greater insights into the level of knowledge and understanding some of the children may have had on the subject matter. Therefore a follow up interview in a semi-structured scenario would take place with a sample of the children in a focus

group manner. This would permit the researcher to gain more in depth information and supply qualitative answers to support the quantitative answers already gained.

It was also decided that the focus group of teachers would be met with and a range of semi structured questions supplied, but that a distinct benefit would be to allow the session to progress in an unstructured way. These teachers were selected from the adults who taught or assisted in the teaching of the children and who knew them well. The benefits of a semi structured interview were to permit two way conversations so enabling relevant information to be gained by the researcher thus enabling views and opinions to be further explored.

Kitzinger (1995) highlights the advantages of focus groups and a number of them could be summarised as follows:When researching, the participation with the group permits interactions, so allowing follow up questions and the opportunity to probe more deeply. The results from such research can be easier to understand than statistical data that is complicated. Non verbal responses like facial expressions and body language are noted and information is gained quicker than interviewing people one at a time.

However, disadvantages are also noted for focus groups. The small size of the groups indicate that they may not be a good representation of the wider population; groups can be difficult to guide and control so irrelevant issues may be covered and time can be lost; Respondents can feel pressured into providing similar answers to other members of the group; the skill of phrasing questions and settings can affect responses and tarnish results.

To ensure the above did not take place a quiet room away from the hustle and bustle of daily school life was chosen where the members were offered light refreshments and time to relax with light humorous conversation away from their daily routines before the interview began. All members were made to feel at ease and told that any answers they

gave were all valid and that no wrong answers were possible, it was each individual's opinion that counted. During the interview the researcher ensured that the topic area was kept to and that all members of the group had the opportunity to speak their views. No one member constantly dominated and no one member was constantly passive.

Bell (2005) informs that skilful interviewers can follow up on ideas presented to investigate feelings and motives that a questionnaire never can. Body language and facial expressions also provide information that a questionnaire never can. Responses to questionnaires have to be taken at face value but interviews can be used to clarify and develop responses.

Cohen et al (2007) also inform that it is required when carrying out group interviews with children to understand the world of the child and how they see it. The group interview would benefit from taking place in an environment that is familiar and relaxed and gaining the child's trust and allowing the questions to be answered in ways that combine methods and activities e.g. drawing, playing, using pictures etc.

Cohen et al (2007) further go on to say that group interviews can be useful as it encourages children undertaking them to interact in the group rather than respond to the adult's question.

D. Questionnaire and Interview Pitfalls

Questionnaires and interviews can have their pitfalls and Cohen, Manion & Morrison (2007) highlighted and advises how to avoid them (p334).

The researcher avoided leading questions by not providing answers that appeared to have only one answer. No highbrow questions with ambiguous language and sophisticated answers were placed in the questionnaire. Similarly, complex and irritating questions were

not used (e.g. from the following list of 10 native tree species which do you think would be best appreciated by the British public in the month of May?). No open ended, negative or double negative questions where included. No rating schemes were selected for the questionnaire, so extremes of rating (e.g. never, totally or always) did not appear. No pressuring or biased questions were asked (e.g. Do you like trees like your teacher?) Furthermore, no questions were used that children could either agree or disagree with (e.g. Do you like trees that have purple foliage?). Finally, ambiguous questions such as "How many trees do you pass on the way to school?" where (it could be possible that no singular route is taken on the way to school every day, or could we mean all the trees just in visual range or trees over a certain size which could exclude newly planted trees) were avoided.

The weaknesses of semi-structured interviews were addressed as follows.
 A degree of skill is required by the interviewer to ensure that the important questions are asked during the interview and the ability of the respondents to get their message across. This was achieved by good planning, piloting the questions, and the researcher's knowledge and understanding of interview processes gained through years of work-based knowledge. The ability not to send out unconscious signals is also required to make sure no clues where being picked up by the interviewee. This is achieved by carefully controlling body language and facial expressions and ensuring that the interviewee is aware there are no wrong answers, they are relaxed and trust the interviewer. Semi-structured interviews can be time consuming and expensive, however this was not the case with this research. Access to the school was easily achieved due to the previously established relationship with the researcher, and no financial costs where incurred. Reliability is also a noticeable weakness as it is difficult to exactly repeat an interview, however due to strict interviewing process it was possible to facilitate this, so guiding the interviews in the direction required,

matching the research requirements Similarly this approach helped with the depth of qualitative information obtained. Also a consideration was that due to the personal nature of interviews, respondents may be answering differing questions, however the researcher overcame this by ensuring that whilst the interviewee was relaxed and felt trust, this did not compromise the interview. If it appeared that the intended question was not being answered, then rephrasing or repeating the question was undertaken to ensure that no deviation from answering the specific question was evident. Lastly there is always the point that the researcher has no way of knowing if the answers provided to them are not false, however this was checked by asking further questions around the answers area to ensure understanding and truth.

The group of children selected for the research were to be one of mixed ability and what could be expected of any typical primary school throughout the country.

Before the main group that were selected were interviewed, it was decided that small groups of children would be used for the pilot questions. As Munn & Drever (1995) explained, students chosen should be broadly similar and have access to the same kind of experience and information that the researcher is interested in.

 It was considered by the researcher and the class teacher that during the pilot session and the main research session that the children could interact with one another to discuss the meaning of some of what was expected to be more challenging and not so easily understood words and phrases (e.g. environment and sustainability). For those two examples it was decided that picturesthat represent them and alternative pictures (in the researcher's opinion after consultation with the class teacher as to being the most appropriate for the class in question) that did not represent them would be used and be

illuminated on a white board through a power point presentation. Young & Barrett (2002) concluded that this type of visual methods allow a high level of child-led participation in research. These pictures where 3 in total for each challenging phrase (environment and sustainability) and once viewed, they would be discussed by the whole class as to what they represent. It was expected that these discussions would provide information on the concept and definition of environment and sustainability so leading to a focusing of their attention for the research questions.

During the pilot session it became clear that some of the pictures represented other items to the children that were not required or desired by the researcher. One of the pictures had a number of images that represented wind farms, and other similar images that the researcher would associate with things that supply a more sustainable approach to life. However all of the images emanated from a back ground which showed an explosion and it was this explosion and not the items coming from the explosion that the children focused on. So for the main questionnaire session a new picture was selected using the valuable feedback offered by the pilot session children that the research group children could relate to more satisfactorily. The researcher judged this to be more satisfactory as new pictures were located and piloted that more accurately represented the items of environment and sustainability and that did not appear to contain any contradictory items or any other main highlighted items to the pilot group.

This still left the challenge of how to define to the children what environment was and what sustainability was. It would be appropriate at this point to look deeper at the words, environment and sustainability and to reference Huckle (2006) concerning these from his briefing paper for the Training and Development Agency for Schools:

The meanings of nature, the environment, development and sustainability

are central to the human sense of identity or being in the world. All are the

bearers of multiple meanings and much academic and everyday knowledge.

While the search for a single body of professional knowledge that will equip

teachers to deliver ESD is unrealistic, the paper argues that all trainees

should be exposed to sustainability as a frame of mind underpinned by

values that support the development of both human and non-human nature.

ESD has close affinities with citizenship education but also requires

contributions from the sciences, arts and humanities. (p3)

It is also important to define the words environment and sustainability as the researcher

applies so permitting an understanding of them for this research.

The Free Dictionary (2011) defines environment as, "All of the biotic and abiotic factors

that act on an organism, population, or ecological community and influence its survival and

development."

Further to the above, The World Bank (u.d) similarly defines environment, expanding

slightly: "The word "environment" refers to our surroundings- the context within which we

exist. All things, living or non-living, exist surrounded by other things, and therefore all

have an environment. For humankind, the environment means, on a broad scale, the

biosphere."

The Free Dictionary (2011) defines sustainability as, "Capable of being maintained at a

steady level without exhausting natural resources or causing severe ecological damage"

The word environment appeared to be more familiar than that of sustainability with the children. With the picture assistance for environment that showed a green agricultural crop growing in a rural field with a blue sky and clouds that represented the continents of Earth, the children had the opportunity to relate to the desired subject, that of the whole planet. Once discussed with them, the focus was reaffirmed as being when we consider the word environment in the session and for the questions, it meant the whole planet. The other 2 pictures were also discussed with the children and equal amount of time spent on them to ensure that no bias could be perceived by them from myself or their teacher. This was also the case for the following question and picture options.

The picture used to attempt to represent sustainability was one that had a green background (two human heads with their backs together, looking away from each other) and laid on top of that various images that consisted of: a modern wind generator, bicycles, people tending to what appears to be an allotment, low energy light bulbs, people walking, a bird climbing in to a bird box, solar panels, water dripping from a tap, recycling bins and a cup with the words Fair Trade written on them. This image was selected from images found using the internet search engine Google. The word environment was placed in the search engine and the title images also selected. The researcher's opinion was that the image selected did represent the phrase it was aiming for and this image was also discussed with the school teacher whose class the research was to be used for and also by the pilot study they carried out. During the discussions on the picture during the questionnaire session (and the other two pictures that were an option to select) we eventually arrived at a phrase that was felt was best to relate sustainability to the children. This phrase was "making sure we don't run out of things". The children then provided answers to things in their lives that they could relate to using the adopted phrase for sustainability.

It was also decided that the question presented concerning how tree roots orientate underground that 3 examples of trees with the underground roots shown would also be offered using a power point presentation, two incorrect examples and one correct one. The above 3 examples would then provide quantitative answers as well as the qualitative answers the rest of the research work would provide.

Drever (1995) comments that "In a group interview one interviewer talks to several people. Note taking while guiding the group discussion is especially difficult and tape recording is probably essential" (p16) . Therefore the decision was taken not only to take notes and tape the interview with the pupil group but also to carry out the same task with the focus groups that makes up this work.

E. Sampling

When considering using sampling for this research Adèr, Mellenbergh, & Hand, (2008) inform that rarely is the entire population used for research as the cost is too great to do so and it is also dynamic, meaning the members of the population change over time. The three main advantages that are noted as the main ones of using sampling are, cost is lower, data collection is done with greater speed, and since it is a smaller group it can ensure homogeneity and improve the quality and accuracy of the data. As for why this particular group was chosen from the school for the research, the researcher had built up a relationship with the school over time, participating in environmental and art days as a volunteer. This permitted the researcher reliable access to the school where he could reasonably expect to be able to carry out and complete the research. The specific group used had had little contact with the researcher, which permitted a fresh relationship with no preconceived ideas for both the researcher and the groups the researcher was to use.

F. Focus Group Children

The interview with the focus group took place in one of the classrooms that was used by the group, so familiarity and relaxation to speak openly and freely would easily be obtainable. In order to achieve validity the researcher consistently remained objective and made it very clear from the onset that no answers provided were wrong nor would any of their opinions, attitudes and expectations be excluded in the approach to the research.

The questions were provided to the class teacher (who also is the schools leader on SD)prior to the first pilot interviews being carried out and valuable feedback was provided by her. It was also offered that during the pilot and main interviews could be carried out as a team between the teacher and the researcher. This would benefit the research as highlighted above by taking place in an environment that is familiar and relaxed, with the added bonus of the familiar face which only added to gaining the children's relaxation and trust. Cohen (2007) writes that the interviewer establishes as a need an atmosphere that is appropriate so that the feeling of security is connected to the participants.

This research also included a practical session led by the researcher and the class teacher where they planted as a group a tree in the schools grounds. This provided an opportunity to experience in practical terms some of the items that had been questioned during the semi structured interview. Every member of the group placed soil in the pit dug for the tree and helped to consolidate the tree in whilst helping to stake and tie it to support it during its establishing years. During this session the children asked questions and the teacher and the researcher provided answers and information that was relevant to the tree planting session and the research.

Once this session had taken place, the researcher and the teacher verbally questioned the whole group as to what they had learned during the whole experience. A mind map was produced and the results along with the rest of the findings are discussed in the following sections.

The questionnaire filling session, the questioning of the whole group as to what they had learned during the whole session and the focus groups comments were recorded by the researcher by writing them down. The above were also electronically recorded enabling a formal record to later check that notes taken were accurate and representative of the comments made.

There were 25 children that took part in this research each answering their own questionnaire (a copy of this can be found in the appendix of this study). They were met initially on one occasion to answer the questionnaire, plant the tree and recap the knowledge and understanding they had obtained during the session.

The children's focus group consisted of random selecting two groups of two children. They were met two weeks after the questionnaires were answered and each interviewed to gain a deeper understanding of the answers they had supplied.

G. Focus Group Adults

It was decided that a focus group of the teachers and assistants of the year group involved in the research would provide the best results. Cohen et al (2007) inform that focus groups partake in a discussion on the subject matter to provide a collective view on the subject material in hand and yield insights that may not otherwise be found in straight forward interviews.

It was vitally important for the researcher to facilitate and manage the group so no one individual either dominated or felt less inclined to fully participate in the group. This ensured that a group collective response was given and all provided a view point that could be worked with. Denscombe (2007) writes that the focus group moderator is responsible for creating an atmosphere that is comfortable for discussions, brings the stimulus and keeps the discussions focused and on track, whilst encouraging participation of all members, making sure there is no intimidation or abuse.

To ensure the above did occur a quiet room away from the hustle and bustle of daily school life was chosen. The members were offered light refreshments and time to relax with light humorous conversation away from the topic area and the school environment took place before the interview began. All members were made to feel at ease and informed that the answers they gave where all valid and no wrong answers were possible, but that each and everyone's opinion counted. During the interview the researcher ensured that the topic area was kept to and that all members of the group had the opportunity to speak their views. No one member constantly dominated and no one member was constantly passive.

Throughout the research undertaken it was essential to avoid bringing preconceived ideas or bias to the proceedings and the words of Bell (2005) were consistently followed, "We must be wise and vigilant, critical of our intentions and wherever possible triangulate." (p167)

The semi-structured question were provided prior to the focus group being interviewed and it was aimed that they would all feel comfortable and have time to reflect on their answers prior to the interview taking place. This was achieved as above. The focus groups comments were recorded by the researcher by writing them down during the interview. The

interview was also electronically recorded, enabling a formal record to later check that notes taken were accurate and representative of the comments made by the focus group. There were 5 members of the focus group and the one interview was undertaken three weeks after the children had initially completed the questionnaires given to them. A copy of the questions supplied to the focus groups is located in the appendix within this study.

H. Method of Analysis

The results have been interpreted by way of grounded theory. Allan, (2003) informs that grounded theory is research that operates in reverse, and may initially appear to be contradictory, however rather than starting with a hypothesis, data is collected through a variety of methods. Key points are then collected from this data and categories are formed from similar concepts. This then is the basis for a theory. Therefore before the researcher consider or attach themselves to any pre-conceived theory, careful consideration and reflection of the data provided is used to ensure that the theory comes from the data. This also supported the aim of staying objective throughout the research.

Denscombe (2007) states the grounded theory approach is appropriate as a social research focus for human interactions, and especially where research investigation is required for practical and routine situations and the participant's point of view is required.

For this research the process was to create theory from the results discovered. The setting for the research is very practical and the participant's point of view was sought, which is also suitable for grounded theory. Grounded theory research is also suitable for small scale research, like the one presented here, to supply qualitative data for the study of human interaction which is exploratory and fixed on a particular setting.

The researcher, as highlighted previously, had initially collected quantitative data by the use of the administration of a questionnaire, however it was considered by the researcher that further, more in-depth information was required to provide suitable data. Therefore two further focus groups where interviewed, the children's and the adults'. Further data was also received by the practical session undertaken by the researcher with the children in the tree planting session, when field notes were taken. This type of research is known as action research, and this, along with the other data received, enabled the researcher to triangulate the data to produce the analysis of the findings.

When drawing on the results from the questionnaire and considering how to present the answers supplied by the children it was discussed and decided by the researcher and the class teacher that groups of answers would be placed together to supply quantitative answers. An example of this would be where an answer to, "What helps with sustainability?" included, turning off of lights, turning off a running tap, recycling etc. All these answers suggest to the researcher that the careful use of resources contribute and the answers could be successfully grouped together. This approach supports the grounded theory method. No theory was taken before the research began; theory emerged through analysis of the data. Also during the focus groups it was considered, after studying the literature and discussing it with the class teacher, that open ended questions would allow the respondents to provide more information which would include their feelings, attitudes and understanding of the subject. This would permit the researcher to gain their true feelings for the issues discussed. This type of question also cuts down on the chance of error and just providing any answer just for the sake of doing so. The use of discussions for the focus groups was also considered to be a benefit as it produces data and insights that would not be accessible without the group discussions. It also can stimulate other members

of the groups to speak about their feelings and experience if someone else tells a similar situation which trigs their recollection. This can also validate each member's experiences and comments.

It also has to be informed that this research like others has its limitations. These could include an inability to answer the research questions, theoretical and conceptual problems, limitations of the research strategy and problems of research quality. However it is considered that some of the specific limitations of this research have been discussed in their context as they have arisen through this study.

I. Other Possible Research Types

i.   Action Research

Denscombe (2007) states that action research looks at practical problems in a positive way, placing the results back directly into practice. The practitioner also gains personal benefits from it and it contributes to self development. This provides a continuing cycle of change and development via on site research in the work place, which benefits the organization as it changes working practices and resolves problems. Practitioners are involved in the research and this generally involves greater appreciation of, and respect for, their working knowledge.

It could be suggested that the research this author has undertaken could actually use the above advantage (and title) to explain part of the research undertaken. This is especially true when looking at the practical session of planting the tree with the school group. Not only did we plant a tree but we listened to the children's ideas of how it should be carried out, demonstrated the most appropriate way to do it and then carried it out as a group.

Denscombe (2007) goes on to point out the disadvantages of action research as the involvement of the practitioner has limits to the scale and scope of research. This however may affect the results and findings, limits the possible controls over factors of relevance to the research, is constrained by what is permissible and ethical within the workplace setting. Action research tends to involve an extra burden of work for the researcher, especially at the beginning, with little immediate benefits and is unlikely to be detached and impartial.

ii.   Ethnography

Denscombe (2007) states that the term ethnography means a description of peoples or cultures. The origins of this research strategy lies with the works of the early anthropologists. Their aim was to supply detailed permanent accounts of the lives and cultures of isolate small tribes seen as endangered species. There was seen to be a need to map out those cultures before they became contaminated through contact with the industrial world or simply died out.

The type of research the author has undertaken was concerned with small population samples of known cultural origin and the above research would not have been appropriate.

iii.   Survey

Surveys are usually used to sample large populations, however Denscombe (2007) points out that surveys are usually used for samples of 1,000 or 2,000 people or events. As the research undertaken requires the targeting of a specific group, a survey below the number of 30 people, it would have not been appropriate to use this system.

iv.   Observations

Denscombe (2007) comments, distinct ways are offered by the collection of data through the use of observations. This does not require recording what people say they do or what they say they think, it's more direct than that. It draws on the eye witness direct evidence first hand. It is best to observe what happens rather than other premises.

To attempt to use observations would have been very difficult to prepare for, observe the desired information and record that information reliably; therefore it was considered this type of research was unsuitable for the researcher to use for this study.

J. Interpretation

The researcher retained an objective approach to the questions during their formation so that they did not contain any preconceived ideas. This permitted greater validity of the responses that were required from the answered questions. The analysis of the data was made also from objective perspectives which allowed for the results discovered to be the same if the data had been produced by another researcher making the same interpretations and generalizations.

K. Ethical Issues

Ethical issues were addressed to ensure that the research could successfully be completed. The school that permitted the research to be undertaken were made clear as to the nature of the project and its intentions. These were fully supported by the head teacher and the staff involved in the research.

It was proposed by me that the school would not be named but only to be located by the general area they are located in, which would allow a context for the audience's pleasure. By executing the research in this way the head and staff could be satisfied that that no

ulterior motives where behind the research and that a genuine interest in the subject and outcomes was desired. The individuals interviewed could also be done so in a manner that would be non-threatening and have no negative consequences for them within the school.

The overall objective was to discover how much information children had concerning the requirements of urban trees and their role in SD. It is hoped that this could be of practical use to ensure that the SD target of all schools to become sustainable by 2020 but also to realize that trees when talked about in a SD context don't only relate to the loss of forest areas around other far off places in the world, but the ones that grow side by side with us in UK towns and cities.

L. Participants

The focus of the research was explained fully to the headteacher, staff and children who participated at the school where it was undertaken. This ensured they were fully aware as to the full involvement of the research work. Therefore fully informed consent was obtained for them to be involved before the research proceeded with data collection.

The children were informed that the questionnaire they had been given and that we would discuss and explain to them was to find out how much they knew about trees before we went and planted one in the grounds of the school. They were further informed, which placed them at ease, that there were no wrong answers, even answers that were left blank were acceptable, and there was to be no marks either given or taken away as the piece of work was not to be recorded for school course work.

M. Confidentiality

All participants were informed that their names would not be used within the study to protect their identity and to ensure honest answers. They were further informed that they would not be judged by the school or any other body, but that the answers would support independent research into the level of knowledge and understanding the children had concerning trees and their role in sustainability.

N. Anonymity

All participants were informed that only the researcher would be looking or listening at the individual responses provided to the semi-structured questions and the recording of the interview. They were further informed that any data that contained individual names or personal data would eventually be shredded and appropriately discarded.

IV. <u>Findings and Discussions</u>

The main aim of this research study is to investigate the following questions:

What do key stage 2 children know about the physiology, physiological needs and maintenance of trees in the urban environment?

What do children understand about how trees contribute to a sustainable environment?

How the schools education for sustainable development contributes to the children's knowledge of trees and trees contribution to sustainable development?

A. Back Ground Analysis of the School

The school featured for this research is a local primary school in the north of England. When researching the school for this case study the following parameters where considered:

Sustainability in the school is an area where a teacher has been assigned to be the champion. This has been occurring for 3 years. The area of sustainability is covered within other topic areas most noticeably geography but is also seen occurring across the curriculum within areas such as literacy and global dimensions. Other across school campaigns have also been set which have promoted friendly class rivalry with, Bike It and, Walk It. These are challenges where the classes get points assigned to them on a daily basis for using sustainable transport methods to school instead of car travel.

Other schemes have also seen a link with St Nicholas Fields where the student council prepared a presentation for the school assembly and placed posters around the school

informing how sustainability can be achieved within the school and at home. This included switching lights off when not needed, not using the school lift unless necessary and recycling paper (recycling bins were already in the class rooms and it is not known if it contributed to an increase in usage after the presentation highlighted) to name a few.

The school also has been maintaining a school allotment at a local site where they grow and use the produce in the school. A newer scheme had also been implemented to have an allotment for each class within the school grounds from the beginning of the growing season 2011.

OFSTED carried out a small scale survey in 2008 concerning sustainability being taught in the classroom and released the report, Schools and Sustainability: A climate for change? However the school in question was not part of that research. OFSTED did however report after the schools OFSTED inspection in 2006 the following:

> Pupils have a good awareness of safety issues and understand the importance of healthy lifestyles. Healthy eating is important to the pupils. For example, pupils participate in Fair Trade stalls in conjunction with a local church, visit a local farm and are working with the local allotment on a project to grow food there which they will eat in school. The school council explained how they had visited a local organic shop and had tasted a variety of different foods and then reported back to their classes about this, and are now working on a project to set up and run their own healthy tuck shop.

Ofsted further reported in their 2010 inspection the following information about the school

The school is a medium sized school which serves a socially and economically mixed community close to the city centre. The proportion of pupils eligible to take a free school meal is broadly average. The school has six mixed-age classes. While a large majority of pupils are White British, one in five is from a range of minority ethnic backgrounds and often speaks English as an additional language. The proportion of pupils, who have special educational needs and/or disabilities, including those with a statement for their special educational need, is broadly average. The school has achieved the Healthy School and Inclusion Awards and the Basic Skills Quality Mark. A privately managed out-of-school club is available to pupils before and after school each day and at holiday times.

The report went on to state under, Outcomes for individuals and groups of pupils, that,

Many pupils make healthy food choices at lunchtime and participate regularly and enthusiastically in the many sports activities the school offers. Growing fruit and vegetables in their own allotment has added a valuable extra dimension to pupils' understanding of healthy living. Older pupils willingly take on responsibilities around school and some have established their own clubs for all to enjoy. Most pupils attend school regularly and their attendance and punctuality are improving. Pupils develop a good range of academic and personal skills which provide a secure platform for their future learning and life. Most are thoughtful, reflective individuals with a well-developed sense of social and moral responsibility. Through the many opportunities provided by the school and regular contact with pupils of

70

different nationalities, cultures and religions pupils acquire a good

understanding of the wealth and diversity of different cultures.

From the above information supplied by the Ofsted report I draw the conclusions that the

school is a typically average school when it comes to the socio-economic status (this

information is gained from its free meals provision) although it could be considered that it

has more variation then some inner city schools due to the report stating that the

community it provides for is "socially and economically mixed". The same could be gained

from the fact the ethnic mix is majority White British. However the information on pupils

who have special educational needs and/or disabilities, including those with a statement for

their special educational need which is broadly average, once again suggests that the school

has a national average perspective.

The report also informs that there is a well developed sense of social and moral

responsibility, opportunities and a good understanding of the wealth and diversity of

differing cultures which appears to be developed as the pupils progress through the school

The school building is an old large Victorian building with limited space directly around it

which can support green vegetative growth, however to the front of the school there is a

small green garden that supports four of what could be described as small garden trees, as

well as some shrubs and herbaceous plantings. In the yard of the school and in the

surrounding gardens that back on to the school grounds a total number of 11 trees of

differing sizes and shapes can be counted. The trees that are in the yard are planted in the

tarmac surface covering, an environment that does not easily support plant growth,

however, I assume that the school desires the children to experience and live amongst the

natural environment so much that they are willing to persevere with the struggle to make

trees grow healthy there. The gardens that border the school are fairly small gardens (and in the most part the catchment area for the school is similar) and trees can be found growing in them. This significantly contributes to the green effect of the school and the local area. This point could also be considered that the local environment have a desire for nature to be close to them and are supportive of green issues and sustainability.

The school field, which is no more than an acre in size, is situated behind a school auxiliary building and cannot be seen when in the school yard or in the lower floor of the school. Here the school has made great use of the field space by incorporating many differing sports facilities as possible, planted trees including typical garden fruit trees and the newly constructed allotment plots.

The school employees are actively encouraged to take on extra curriculum activities, and I have witnessed this by many of them. As an example the Site Manager of the school coaches the girl's football team and supports them when they play games with local schools. Another example is the extra curriculum gardening club run at lunch time by the school's Road Crossing Patrol.

The school also has a newly revised mission statement that is 'Achieving great things together' and in the Ofsted report of 2011 they commented that the mission statement "epitomizes the ambition and unity of purpose shared by all who work and learn at the school."

The council ward that the school is located in is also supported after local councillor elections in 2011 by two Green party members. This was the case before the highlighted recent local councillor elections. This could be considered to suggest that the parents and guardians of the children who attend the school are supportive of green and or sustainability

issues in a high proportion, as they are among the population who voted for the Green party members. This could be considered as an influence for the activities the children undertake in their time away from the school, the way in which they live their lives and the underpinning philosophies and practices.

From the above it appears to the researcher that the school has a strong sense of community, equal and shared responsibility for all issues including green and sustainability issues.

B. Presentation and Analysis the Data

i.   <u>Question 1</u>

How do trees get into our towns and cities?

The overwhelming majority of the class (85%) provided written answers that trees are either planted or that they grow from seed. The remainder of the class provided either no answer (7.5%) or provided an answer that did not make sense to the researcher in relation to the question set (7.5%). When discussing the question with the class members, and as the above results appear to show, the children have a good grasp of the fact that trees, like any plant growing in an artificial environment like a built up urban environment, need a degree of human intervention. However whilst a number of children provided answers that trees are both planted and grow from seed, a number of them provided a single answer that they grow from a seed with no mention that human intervention takes place. However a number of answers mention that whilst trees grow from seed they also had been planted by someone or had a similar phrase to describe it.

The frequent use of the term seed also needs attention. Why is it used so often by the children? The children have a school allotment and on that allotment they have grown crops from seed. It could be strongly argued that the children have used lateral thinking with the knowledge that they have and applied it correctly in this situation.

The children's focus group informed that they had witnessed in the past someone planting trees. Examples of this consisted of family members carrying out the task, friends of the family and the children had also taken part in planting seeds, namely apple pips with elderly members of the family. It was not known if the adult had instigated this action or if

the children had however there where visual signs picked up from body language that suggested it was not the children. From this I present that the adults are carrying out the task because of the fun and social benefits including growing your own fruit and the wider environmental benefits that would be experienced and hopefully taken with the children as they journey through life. One child also added that birds "plant" seeds. Whilst this is not strictly a correctly termed answer there is a degree of truth to it. Many trees have evolved with bird species so that the birds act as a vector to transfer and transmit seeds away from the parent specimen and distribute the seeds to new areas.

The adult focus group presented that the children prior to this research being carried out with them had little understanding or knowledge concerning the question the researcher asked them about trees. However they had experienced some learning concerning trees during the work that was carried out in years 1 and 2 with the allotments they were involved in. They had been instructed that whilst they where sowing seeds of various types of fruit and vegetables, potting up plants and transplanting them that trees could be produced and grown in the same manner. However they appeared not to have retained this information.

The allotment club that is run at the school is an extra curricular activity and also consists of children from outside the school, however all year groups in the school from the academic year 2010 / 2011 have constructed and grown vegetables and fruit in a raised allotment bed.

It was put forward that during the learning at the school this year they had been investigating the development of the local area through time in the subject History and Geography. Looking at how the development of settlements are affected by their

surroundings. In this they had explode how the natural environment (including a significant number of trees and woodlands) had been replaced by agriculture, dwellings and industry over time to produce the local landscape they see today. From this it was suggested that the children considered that trees had always been in the local area and no intervention was needed by man to ensure that they are still here today. This shows a distinct deeper level of interdependency relationships between plants and birds and a higher level of understanding for this child. Vare and Scott (2007) commented on the ideas behind ESD1 and ESD 2 where a building capacity to think critically was required, in the above example provided by the child a similar deeper thinking appears to have taken place to arrive at their comments.

Once the questions on the questionnaire presented to them where discussed the adults believed that they used the knowledge they had and transferred it to the task in hand, which produced the results. This approach demonstrated by the children further suggests some form of critical thinking has taken place. Huckle (2009) informs that critical thinking is required by school learners to progress sustainable development education and to transfer the knowledge the children held about growing fruit and vegetables to other plants and in this case trees. I would further argue it is required to progress ESD from ESD1 to ESD2 as suggested by Vare and Scott (2007). I am mindful that at times during the research with the children I did question whether a child of this age has the ability to have any depth of critical thinking however on later reflection there appeared to be as a minimum some members of the group who exhibited critical thinking, therefore it could be considered that some of the children are in the process of developing critical thinking and this should be encouraged and supported during their continuing learning especially in the case for ESD.

As part of the above mentioned studies in to the development of the local area, the children had been on a walk around their immediate school environment to observe the present situation and visited amongst other places the local river. This has occurred after I had carried out the research questionnaire with the children. When at the river, a council employee was planting a standard tree to replace one that had to be felled due to an unacceptable risk being attached to it. The children, the researcher is informed, were very enthusiastic about this and showed great interest and used the understanding they had gained to not only appreciate the new tree being planted but also to view the existing trees along the river.

During the month of May the UK experienced unusually strong winds for the time of year. In the school grounds in question one of the rowan trees that had been growing there blew over. The response from the children was one of surprise and concern. It appeared that the children had the concept that trees were very long lived and almost indestructible. The school used the demise of the tree as a subject matter for writing, where they could explore various themes and issues around its demise and the potential both good and bad of its failure on its surrounding environment.

The adult focus group had also informed that when learning had been undertaken outside the classroom during a walk through the local environment discussing the development of the local area through time in the subject History and Geography, an opportunity had arisen to gain knowledge that had not necessarily been the main topic of the session. This concerned the replacement of the ancient woodland of the UK with initially agriculture and then industry with the associated infrastructure and dwellings. This can clearly be noted as cross curriculum learning. Loughland et al (2002) stated that a way to achieve better

environment education that is treated as a relation and not as an object is to have integrated curriculum that cuts across disciplines.

Other important points raised by the adult focus group was that the children exhibited that trees are indestructible and were and will always be there. This point under pins this research, that most people feel that trees are indestructible and can survive almost any abuse. From the changing landscape of the local area studied in History and Geography, the children's noticeable knowledge of the above had been noted by the adults. However a change in this understanding came about by the experience of the tree blowing over in strong winds in the school playground. This change in their understanding that trees are not indestructible, and accordingly they need to be carefully cared for to ensure they are with us for future generations. This could be an embryonic moment for the children which could last with them throughout their lives. The sudden realisation that trees and the environment more generally are not indestructible appears to have germinated with the children. I would argue that an event such as this could be the start of a greater and deeper understanding, connection, and ownership in understanding ESD and provide a platform for closed loop thinking as commented upon by Webster & Johnson (2008). It is also noteworthy that without the opportunity for the children to undertake essential learning in a local natural environment this experience and knowledge would not have been gained.

ii. Question 2

Do the trees in the school grounds need to be taken care of as they grow and age? If so how and who does it?

The class presented very strong results for this question. 96% of them answered that trees did need to be cared for as they grow and age, none stated they did not need to be cared for

and 4% did not present an answer of any description. Within the 96% providing the answer that they need to be cared for, all 92% of them gave an answer for the next part of the question, how and who does it. 54% stated that they are cared for by a combination of descriptions that I have grouped together which consisted of the answers, "ourselves, the school" or they named an individual at the school who they had been taught by / worked alongside when carrying out work on the school allotment. 38% of the group gave the answer that a gardener takes care of trees. This left 8% who gave no answer at all. It was also noticeable that 56% of the answers supplied also informed that the activity that needed to be given to the trees was to water them, 4% informed that they needed to be protected (but didn't say in what way or from what) and 20% stated that trees need sunshine to grow.

Two answers came from the children's focus group that trees are planted and cared for by a member of the staff who runs the gardening club. Both of these answers came from the members of the group who had previously been members of the gardening club. In the club they had planted, watered, potted on and generally cared for the plants. They hadn't specifically tended to any trees as part of their club activities however both realised that trees are plants with similar care needs to be taken of young developing trees. Two further answers came that the schools teaching assistants cared for the trees in the school, which included watering them when they needed water to grow. One child mentioned that the Council planted and cared for trees in the local streets and this prompted another member of the group to inform they had also noted this. One member of the group stated that everybody in the school cared for the trees as when they were playing football and other games care needed to be taken to ensure they were not accidently damaged. This suggests that some of the children are taking ownership of the trees and or plants in general. When asked how they are being cared for the answers included they need to be watered, provided

with sunshine and protected. Trees that are mature established and thriving do not usually need watering. Trees that are growing in artificial environments (e.g. pots), newly germinated or newly planted usually do need watering. All trees need sunshine to grow and all trees to a lesser or greater extent do need to be protected to ensure they can grow unabated, once again this fact under pins this research. I therefore put forward that the comments supplied above where focused in the main on trees that are newly germinated are growing in a new environment. This appears to have been answered in this way by the children from the experience they have gained from the allotment club and class allotment or the schools gardening club. It is worthy of mention that the gardening club had been attended the previous academic year by the children. It would appear that the knowledge and understanding had first been attained then and now continued to be understood and practiced. Rovira (2000) argued that primary school children where the most conscious and formed environmental awareness at this stage. This enabled them to then form positive environmental habitat behaviour. This formation of environmental habitats had also improved the local population.

One child had informed that everyone in the school had to care for trees. This statement was supported by the fact that when they played football in the school grounds they had to take care not to come into conflict with any trees as they could become damaged. In answer 1 above the initial thoughts were that the children appeared to believe that trees were indestructible, however the focus groups were held after the incident of the tree in the school playground being blown over. It appears that this event had provided an example to the school children that trees are not indestructible but can be fragile and need to be afforded suitable care to ensure they can thrive.

As highlighted in the previous heading it was put forward by the adult focus group that the children had spent little time thinking about who, if anyone, took care of the trees in the local area. Also along with the previous question, the adults suggested that the children had no idea that trees needed to be looked after in the local area and that they were always there and successfully cared for themselves. One member of the group provided an example of this; she had seen a child swinging off the branches of a fairly young tree and had asked the child to stop doing it. The child had an expression of bemusement and asked why? The adult informed him that his actions could break the tree to which he answered that it wouldn't brake by his weight swinging on it because the tree was too strong (which was not the case). This provides an example of how the children believe that trees are indestructible.

Once again during the questions, after we had discussed them for the research, it appeared that the children used lateral thinking to attach it to the care of trees from the work they had carried out in the allotment and the gardening club that is run at the school as an extra curricular activity. There is also evidence here I would suggest that no critical thinking has taken place to evaluate who plants and looks after trees generally. The question could be asked why not? Is the ESD learning they have experienced just ingested? Does it not generate a deeper interest in the children? If not is this because it is delivered in a poor manner lacking enthusiasm, or could it be that it does not challenge the children to consider and think about ESD in other areas of their lives. The answers to the previous questions I would suggest are mixed. It appears to be clear that the range of answers supplied would support that ESD learning is at this stage not stimulating critical thinking consistently. This could be improved by delivering the learning in a more inspiring and thought provoking manner, which could lead to greater understanding that would benefit the children and society now and in the future.

The adult focus group also stated that the witnessing of the council employee planting the tree at the side of the river had contributed positively to the practical activity we carried out with them in caring for the tree we all planted. Since that time the tree has been regularly watered with great enthusiasm and appears to have not only established successfully during one of the driest springs on record but is thriving. This is also interesting as this has direct links not just to the research literature citied that has researched the benefits of learning in green environments, Ballantyne and Packer (2008) Malone (2004) and Fisman (2005), but also on learning styles. Honey and Mumford (2000) informed that one of the learning styles used is an activist. This learning style refers to a person who prefers the challenges of new experiences, involvement with others, assimilation and role-playing. To not provide children the opportunity to carry out their learning in this manner would remove a large area of accepted good practice and deny many in the first instance the opportunity to learn and secondly the opportunity to continue that learning through ESD to further closed loop thinking.

iii.   Question 3

Draw a tree. Name each part and what they do.

The whole class of 25 children presented a drawing of their interpretation of a tree. From that 92% of them also provided some form of labelling to some parts of their drawing of a tree. It was also noticeable that 64% of the class labelled the roots in their drawing of a tree. 8% of the class also showed a seed amongst the root system in their drawing of their tree and labelled it accordingly and 8% did the same but instead of showing a seed they showed a bulb. Only 24% of the class actually gave any explanation as to what function any parts of the tree carry out and this description were all aimed at the roots. From that above

percentage 8% informed that the roots take up water and 16% described the roots as either helping the tree to grow or survive.

For this question some varied answers where supplied. One member of the children's focus group informed that whilst playing football they had knocked over a plant, which led to the exposure of its roots. They had further noted roots around the base and spreading from a tree. This was in the local Museum Gardens. A second child had previously tripped over surface roots of a tree and had noted them on the local river bank where they had become exposed due the erosive nature of the water. A third child commented that the knowledge gained from the gardening club had permitted them to transfer knowledge and apply it to trees as they where plants also. Another member of the group also commented that they had observed roots at the base of the tree but had also read about them in a book. As the focus group was after the questionnaires when we had looked at roots in some depth it could be argued that I could have influenced the group, however the results from the questionnaire that almost two thirds of the class labelled the roots suggest that they had used existing knowledge to provide the answer.

 The second part of this question was answered that roots of a tree collect and supply the tree with water and nutrients same as other plants. This knowledge I put forward was gained from the gardening club and the knowledge transferred.

The adult group all said that they were surprised and disappointed in what had been produced for this question. Whilst the majority of the class had drawn something that resembled a tree and had it labelled, the labelling was often incorrect. E.g. the trunk of the tree had been labelled branch or the roots labelling pointed to the crown of the tree.

One member of the adult focus group commented that when they are learning about trees they often start with a mature specimen and label the parts. However they children did not receive any information on how the tree first arrived in its growing location or how it became mature and what it looked like as it matured. It could be suggested that this contributes to the children's lack of understanding of how trees arrive in our urban areas and that they are indestructible. It was also commented upon that they do not provide information on the trees' life processes, however it was further discussed that this happens in later key stages.

The above shows that the children have attempted to apply critical thinking. They have used the knowledge they have and transferred it to the labelling. This has however not produced the correct answers. Whilst critical thinking is required, this needs to be supported to ensure that the children understand and are not forming incorrect outcomes. Also highlighted is that it appears the children are just viewing trees as a static object that does not change over time. The environment, to discuss the issue in its wider context does not stand still, it is continually growing, changing and evolving and to understand how to ensure that it is still there providing the benefits that it does not just for this generation but for future generations, it needs to be understood that it changes and knowledge of that process obtained. It could be commented upon that it is not appropriate for children at this stage to be supplied that information, however I would argue that it is critical to start to supply the children with this knowledge at this age so commencing a life long journey of understanding and appreciation of ESD and closed loop thinking. This point I argue are supported by Rovira (2000).

Every child in the class was able to draw a tree and provide labels for the parts. However it was noticeable that some of the labelling provided was incorrect. This suggests that the

children were familiar with the parts of the tree. What was interesting was that almost two thirds of the class labelled the roots. The roots are the forgotten part of the tree but they, along with the environment they grow in, are the most essential. They provide the water and nutrients for the tree to make food. If this is restricted from them either through their lack or due to a poor rooting environment, it is similar to a person not having adequate food. If it goes on long enough they would both slowly die. A small proportion of the class also drew and labelled a seed or a bulb. Only approximately a third of the class gave any description to what the parts they had drawn did and all of those comments were aimed at the roots where they informed that they helped to provide water, grow and survive. The above two points would once again relate to the other allotment and gardening activities that had been undertaken and the knowledge from that being transferred. It is also representative that no knowledge and understanding was presented to the contribution the upper parts of the tree carry out. This was part of the research question and one that I assumed would have provided some positive results too. It is also noteworthy that in question two answers were received that trees need sunshine. I would then ask what do the children believe they need sunshine for, to sunbathe? I would suggest that the children do know that other parts of the tree need sunshine but cannot provide substantial evidence that it is for growth. However I would argue that this suggests that the children may have some faint idea that trees need sunshine to grow, so relating it to their physiological needs, but cannot relate it to their physiology as the research question asks.

Using drawings to help children express their knowledge was commented upon by Bowker (2007) who claimed that this gave an insight into the children's understanding and learning about tropical forests and provided an effective method of assessing some aspects of their

learning by the analysis of their drawings. I have used the same technique to comment above.

The adult focus group commented on how disappointed they where that some of the labelling to the tree had been incorrect. They felt that more in depth study of a tree would be supplied in later key stages, however one thing they were aware of was that when they do discuss trees and other similar subjects they focus on a tree at a specific stage of its life, e.g. a mature specimen. There was never any discussion on how it progresses from a seed or a newly planted tree to a juvenile on to a mature specimen and then later into a senile specimen. This is clearly a very important point, I am asking children what they know about trees as part of my research but it could be quite feasibly answered that the majority of the information they have picked up would most probably been received from outside school, and they may just be thinking about a tree in one stage of its life. The obvious points of allotment and gardening activities that they have undertaken have already been highlighted previously and continue to be presented and I would argue that these activities have made a significant contribution to the tree knowledge and understanding the children have at this stage albeit lacking any depth and rounded understanding.

iv.   <u>Question 4</u>

We can see the above ground parts of a tree, like the branches and leaves, but how far underground do the roots grow?

For this question the power point presentation was used. Three differing options were presented on the same slide. Each showed a winter silhouetted tree denude of its leaves with differing root systems under ground, these where labelled A, B and C. These differing picture options where explained verbally to the class and an opportunity provided for the

children to ask any questions they required to make to clarify any points or issues they noted or encountered. The options ranged from root systems slightly larger than the above ground branch work in size and volume (option A), one showing a root system smaller in depth and width than the above ground branch work system (option C). The final option B was the correct one and this showed a root system wider than the lateral branches reached out horizontally from the trunk but fairly shallow (approximately one fifth of the height of the tree). The children presented the following results. Option A 16%, option B 32% and option C 52%.

Two members of the children's focus group commented that when choosing an answer from the 3 diagrams supplied to them on the power point presentation they had simply guessed an answer. One member of the group stated that they felt that this root system for a tree looked more natural. Also a member of the group informed that through their observations they had decided that the answer they had chosen would be correct. With reference to the final comment I have been observing trees many years and none of those observations actually tell me how trees grow underground as they are hidden. Using the knowledge they have gained to suggest they picked an answer that looked more natural could suggest many things. The majority of people have the understanding if asked or pushed on the subject that the roots under the ground are similar to what is found above ground – a mirror image. This is not the case. It may be that the volume of weight could be similar (although I have yet to see any work to support that) however many variables could also influence they layout of roots e.g. in urban areas roads or buildings would limit root growth. When discussing this question with the children the concept of how tree roots grow under the soil level appeared to have not been introduced to them before and therefore no critical thinking is noted.

The adult focus group unanimously agreed that this kind of knowledge and understanding was not with the children and that when they discovered the information on how trees roots grow with the depth and spread they have, they were very surprised. It was suggested that the children's knowledge was that the roots where all the same size and didn't consist of large roots for anchorage and support and smaller roots for the uptake of water and nutrients, however saying that some showed that the roots did provide the essential service of support, anchorage and the uptake of water and nutrients. It was suggested by one member of the group that the children had seen roots by the river due to soil erosion by the river exposing them so had been exposed to the existence of differing size roots.

From the above it is quite clear that the children did not understand the layout and physiological function of roots as asked in the research question, although they were aware that trees had roots. This question is the embryonic basis of my desire to carry out this research. It's not only children that do not know how tree roots are orientated underground, in my experience adults do not too. The tree is the apex of this research but the information supplied also has an impact on the children's level of knowledge of the wider environment issues. Trees grow side by side with us, we pass many every day but no thought is given to how these trees sustains themselves. A similar level of knowledge can be seen with sustainable development issues, the vast majority of the public don't have the information and maybe they don't care. To provide this as early as possible to children ensuring they are aware of the crucial issues at stake will only bring wider appreciation and understanding.

   v.   <u>Question 5</u>

How do trees help with the environment?

For this question the power point presentation was also used. It was considered that the term "environment" had to be understood by the children before they could answer a question on it, therefore a discussion on what the term environment meant and how it could be understood was undertaken. This was to be answered by the children initially as part of this question as an A, B or C answer taken from three pictures, one of them representing "environment". Three differing picture options were presented on the same slide. The first picture presented was one of a single storey building which was being used as a cinema, this was option A. The second picture option was the picture for environment and labelled option B. It showed a green agricultural crop growing in a rural field with a blue sky and clouds that represented the continents of the Earth. The final picture was one of an office environment that presented a desk and chair with a monitor screen on the desk. All the pictures where discussed with the children and equal amount of time spent on them to ensure that no bias could be perceived by them from myself or their teacher. This was also the case for the following question and picture options and the previous one.

The answers to the first part of the question on whether environment was represented by option A, B, or C on the slide show are as follows. 8% answered that option A represented environment, 24% answered that option B was correct and 68% provided no answer at all.

For the second part of the answer, how do trees help with the environment, the answers are as follows. 72% of the class gave an answer to this, with 12% saying they helped with paper, 16% that they assisted with oxygen, 16% saying they are an assistance with food, 12% saying they helped with paper and oxygen, 12% informing they helped with food and paper and 4% replying that they helped with soaking up petrol.

The adult focus group all felt that the higher intellectual understanding of how trees help with the environment was basically out of the children's understanding. However one child did exhibit an understanding far higher than her class mates and this came as a surprise to the member of the focus group but, nevertheless her opinion was still that the whole concept of trees helping with the environment was not totally understood by the children.

The group put forward that the children had 'book' knowledge of the trees and environment and specifically how they linked, however this was difficult for the children to understand and they had more practical knowledge of tasks that could be carried out with trees e.g. caring for trees etc that would benefit the environment. Having stated the previous one child had exhibited that she did understand it and this I argue is a clear indication that children at this age can understand these concepts but perhaps we as a society are not at present providing the information in enough quantity or clarity e.g. not as integrated in to the cross curriculum learning as it could be and delivered at the correct level. This knowledge and understanding was defined as the ability to carry out practical tasks that benefited the environment. Once again it was stated by the group that the children had experience of trees and environmental benefits they can bring, from the school making visits to the local environment and they felt that the "drip" exposure to the children of this type of education would bring further and long lasting benefits. Other examples of these practical actions would of once gain come from the allotment activities, the gardening club and visits in to the local environment where discussions took place. The practical activities also included caring for trees which had been undertaken with the researcher during the tree planting exercise. It is well documented that practical experience in green environments provides great rewards to the understanding and knowledge gained by children. Ballantyne and Packer (2008) commented amongst other things that learning in green environments

provides more enduring and longer lasting knowledge that promotes attitudinal behaviour changes. Malone (2004) also states that there is a need for children to use green spaces to learn so they connect, engage and respond to nature so contributing to global sustainability. Also Fishman (2005) argues that if children have awareness of their local biosphere this has positive effects of their knowledge and understanding of environmental concepts.

The group also highlighted the work they had carried out with a local environmental group, St Nicholls Fields and the enthusiasm this had created amongst the children with regards to the environment and sustainability issues. My own experience also supports this idea. The time I spent with the children planting the tree was greatly received and fuelled great enthusiasm and a strong sense of responsibility and ownership of the tree. Devine-Wright et al (2004) commented that using knowledgeable environmental educators did provide greater awareness on large scale environmental issues and had a positive effect on the children's beliefs. It is clear to me that should you want to provide specific learning opportunities to children the best way to do this is by using knowledgeable resources and educators. I would not expect a primary school teacher to have the depth of knowledge for tree issues in this case that I have or for them all to have the ability to turn that in to learning potential that they can easily and successfully access.

The results from the children's questionnaire where they had to choose 1 picture from three that they felt represented environment showed that they basically did not understand either the question or the term environment. Despite the pre question conversation where the researcher attempted to describe and inform what environment could mean little understanding was shown with the results. However, it still needs to be considered how the children respond to the second part of the question, "How do trees help with sustainability?", if suitable answers were not supplied, then perhaps the researcher in his

attempt to define environment had only confused or basically failed in that attempt. The second part of the answer gave encouraging results, with 72% supplying answers around the subject that trees help with paper, oxygen, food, and one child informed that they helped to soak up petrol. It is clear to the researcher that the children are aware of the importance of trees to environment; however they appear to be unable to define what the environment is at this stage. This knowledge appears to be imbedded with the children and one could expect that as they progress through life, if the exposure to environmental and sustainability issues is continued then they will continue to be aware and act in a suitable manner to the sustainable use of resources.

With the discussions with the children focus group one member told how they had seen that trees help with the production of oxygen on the children's TV channel CBeebies and the programme Charlie and Lola, another commenting upon an advertisement that promises to replant a tree for every one felled to produce toilet paper. These are clear indications that the media can also have an effect on the practices and knowledge concerning sustainability issues and that a multi frontal approach to dealing with these issues across society from an early age can produce exciting results. Other areas of information that had been picked up by the children included from senior members of the family and books.

There are clear signs above that a multitude of sources have contributed in some knowledge being gained by the children concerning SD. This needs to be built upon with stronger emphasis on linking the learning to the wider effects on the environment whilst at the same time continuing with the use of local green environments for learning and knowledgeable environmental educators.

vi.   Question 6

What does sustainability mean?

For this question a power point presentation was also used. Unfortunately during the discussions with the class the power point was accidently clicked on a frame which revealed the answer. Therefore no credible comments can be made from this. However the following process was undertaken.

It was considered that the term "sustainability" had to be understood by the children before they could answer a question on it, therefore a discussion on what the term sustainability meant and how it could be understood was undertaken. This was to be answered by the children initially as part of this question as an A, B or C answer taken from three pictures one of them representing "sustainability". The picture used to attempt to represent sustainability (option A) was one that had a green back ground (which happened to be 2 human heads with their backs together looking away from each other) and laid on top of that various images that consisted of, a modern wind generator, bicycles, people tending to what appears to be an allotment, low energy light bulbs, people walking, a bird climbing in to a bird box, solar panels, water dripping from a tap, recycling bins and a cup with the words Fair Trade written on them. During the discussions on the picture (and the other 2 pictures that where an option to select) we eventually arrived at a phrase that was felt was best to relate sustainability to the children. This phrase was "making sure we don't run out of things". Option B was a plane in mid flight. The final option to be discussed before an answer was requested was C and this was JCB type digger with its front bucket up in the air with the sun directly behind it. The answers are as follows. 92% chose option A which was the correct answer and 8% gave an answer that didn't make sense.

Three members of the children's focus group had answered that trees provide paper and that they also provide oxygen that helped people breathe. When informing how they had this knowledge one member of the group stated that they had seen it on the TV programme, Charlie and Lola that is shown on CBeebies that their young sibling watches. Another member informed that they had read it in a book. One member of the group had written a very interesting answer on their questionnaire sheet, that "trees soak up petrol". In discussions with the child it became clear that they actually meant that trees take up the fumes that cars produced from the burning of petrol. Unfortunately this member of the focus group could not recall where they had learned this information. Another member told how their aunt had passed on this information concerning trees providing oxygen however they could not remember how they knew paper was made from trees.

This question provides lessening depth of answers. One child from the focus group did state that it meant not running out of things and recycling and saving energy. When probed they informed they had learned it on a sustainability day they had at the school presented by a member of St Nicholls Fields at the beginning of the calendar year. It was noticeable however that two children could provide little in the way of a tangible answer.

As with the previous question the adult focus group put forward that the children did not have a high function understanding of the word and definition of sustainability. Once again the group suggested that the children had a practical understanding in how to achieve goals leading to sustainability. These were through practices such as, using stairs instead of the school lift, turning lights off when not needed, closing windows to retain heat during cold periods of the year, turning taps off when running water was not needed, recycling of paper, glass, plastic etc and generally not wasting resources. The group informed that this knowledge within school and been delivered by the school and also with the contact with St

Nicholas Fields, however they were not totally sure what the true impact of this learning was having on the children generally.

This previous comment as with the comments made by the researcher above shows a clear link to the benefits of using knowledgeable environmental educators and learning in green environments. This is a clear indication that more critical thinking is required to move on from light green thinking to bright green thinking, so understanding the concept of closed loop thinking (Webster & Johnson, 2008). Recycling is only a very small part of the action need to provide better SD.

vii.   Question 7

Can trees help with sustainability and how?

This question provided a wide range of answers as follows. 12% presented that they helped with breathing, 28% replied that they help with food, 4% wrote that they provided paper, 12% provided no answer, 8% answered simply yes, 4% each either answered that they provide food and water, water and paper, food and oxygen or water and energy. 8% stated that they assisted with paper and wood and 16% left a blank and gave no answer.

The adult focus group felt that the wording of sustainability as previously highlighted was too difficult of a word and concept for the children to understand. They felt if the children were prompted then they could provide an answer to the question aimed at them using the correct language about sustainability, however the language was still difficult.

The questionnaire the children attempted gave many examples of how sustainability helps, e.g. growing fruit on trees like apples and bananas etc and this to the researcher is a clear indication that they children have a good understanding and knowledge of actions they can

take to make a valid and significant contribution to society. To provide these answers show some understanding of the phrase, however, that may be at this time a very superficial one. Also for part of the research question "how do trees contribute to sustainability?" answers have been supplied that inform that trees play a part, e.g. by growing fruit. There is a clear link of understanding by the children here that supplies an answer the researcher has been looking for. Along with the other comments concerning the terms environment and sustainability however it seems to be at this stage fairly superficial and just in an embryonic state. This needs to be built upon at this stage of their learning to ensure they move on to gain the knowledge and understanding to make more of a contribution to SD.

During the children's focus group the above statement the researcher makes was further supported. The children provided more depth to their answers by informing if we reuse things as much as possible then other things don't need to be chopped down. What was also enlightening and supportive of the claim I make that the children had a fairly surface grasp of sustainability issues was that one child attempted to describe a visit he had made whilst on holiday with their parents to a "museum" that had bananas growing in it, was made in a bowl shape out of glass and was in the UK. This appears it could have been the Eden Project; however the fact that he linked it to sustainability I believe supports my claims concerning their knowledge.

The adult focus group informed that they felt that the words of sustainability were too much for the children. Whilst I would agree with the above statement it is also noteworthy that when the children are prompted and examples giving to them concerning sustainability in language they can understand and the action they can take e.g. recycling etc they have knowledge at this time to implement actions that make a difference to long term sustainability.

Can you think of any other things that can help with sustainability?

This question provided a wide range of answers and they are as follows. 36% stated a combination of turning off electrical equipment, reusing or recycling water. 36% answered a combination of recycling paper, glass and cans. 20% wrote answers or provided answers that made no sense. This left 4% illustrating wind farms help with sustainability and 4% said save money.

All of the children's focus group stated that recycling helped with sustainability. Examples of this where recycling glass, paper, water and energy. For glass and paper it was informed that they could be made in to new things. The children also stated that they had gained this knowledge from the TV, guardians and allotment club. It appeared to me that the children know that recycling and reusing helps but did not understand the in-depth intrinsic way in which it did help the global environment.

The adult's focus group returned similar feed back to this question to the previous two accounts. This continued reported comments therefore consolidates the earlier points raised by the researcher that the children have a good practical grasp and day to day knowledge of behaviours they need to carry out to make a contribution to sustainability, however their knowledge of sustainability and the issues around sustainability of the environment at this stage appears to be in its infancy. However it was expressed that the lack of experiences the children have been provided concerning trees and suitability was a factor to consider when evaluating the children's understanding and knowledge of the subject. It was also stated by one member of the group that posters for events at St Nicholls Fields for sustainability issues had been placed on the school walls, and that some children had gone to these events

in their time away from school with their parents and guardians. However it was not known if this had been initiated by the children or by their parents or guardians.

The adult focus group also commented that very little work had been carried out on trees with the children; however I constantly received comments throughout this research of the benefits of trees to the environment and their positive impact on sustainability. This appears to have been a combination of factors that have contributed to this including, the allotment club, class allotments, gardening club, cross curriculum teaching, visits to green environment to carry out learning, visits to and from knowledgeable environmentalists, TV, the media and family members. This drip drip approach appears to be providing a constant source of benefit, however it needs to move to the next level of more critical thinking and introduced to the concept of closed loop thinking.

C. The Children's Focus Group

The focus group that consisted of the children was selected at random from the children who had participated in the questionnaire. This was carried out by assigning a number to each child's name, then putting the numbers in to a hat and pulling out the numbers without looking in the direction of the hat whilst the activity took place.

D. The Adult Focus Group

The focus group that participated in this research consisted of a mixed group of teachers, teaching assistants and classroom based volunteers who also assisted in the questionnaire that was completed by the children.

E. Practical Tree Planting Session – Field Notes

The session was used to plant a tree on the school field. It provided an opportunity to demonstrate and talk in more depth about trees and establishment. It also doubled as a tree planting commemorative session in honour of one of the children in the group who had lost his mother the year before.

The tree was a bare root tree of a standard nature. Before the children had entered the field I had pre dug the hole and driven a tree stake in to the ground which would eventually support the tree. The main reason for carrying this out was to simplify the session so the children's attention could be held over the shortened period so keeping them motivated. The trees bare roots had been protected by a strong, specially produced polythene bag and I had watered the roots before planting commenced. We examined the tree to be placed in the pit and I was questioned why the tree had so few roots after they had been informed under question 4 that the roots could grow up to 3 times the height of a tree. This reason passed on to the children was because it wasn't practical to lift all of the roots as they would be too great to transport. Therefore a compromise had been made and now it was essential that we cared for the tree during and after planting to ensure that it thrived in years to come. The tree was placed in the hole at the correct depth to ensure it will grow well. We then placed the soil in the hole and this was carried out by every member of the group including the adults. We then slowly firmed the tree in ensuring that no large air spaces where left. Lastly we fitted a rubber spacer and tie from the stake to the tree which would provide anchorage and support to the tree whilst it grows new roots to anchor and support its self. The children asked questions during this session helping them to understand the process and enabling me to understand their present level of knowledge and how effective my comments had been.

This session provided invaluable information and supplied the children an opportunity to put in to practice some of the issues we had discussed.

One thing the children did ask after we planted the trees was why we were not watering it in; they further went on to say they had done this at the allotment sites and in the gardening club. The reason we hadn't done it during our session was because the tree was dormant and the soil held ample water at that time, however I did comment why they would have carried out watering during their clubs, which was because it would have been placing it in an artificial environment with limited capacity for water storage and uptake. The children also commented upon the care that needs to be taken and from this I was aware that they began to understand the fragility of trees, that they arenot as indestructible as some had thought. The session was eagerly greeted and carried out with much enthusiasm and it is clear to the researcher that this practical activity provided a great sense of ownershipnot only to this tree, but other trees in the school grounds and further afield in the community. This feedback also came from the adults as the children had ensured and had been concerned that the tree was growing successfully and being watered during the following months. These previous comments are also supported by O'Brien (2009) and Hoffman et al (2007). They comment on the benefits to both the individual and to society of learning in natural environments. The benefits to the individual is supplied in the form of self esteem, self efficacy, better communication skills, improved language, motivation, concentration, confidence, interdependency, loyalty and physical attainment. Qualters (2010) also informed that if learning in the classroom was experienced outside, greater benefits come about, including a deeper understanding of the world which would benefit not only the student but staff, administrators and the community as well.

F. Research Questions

Relating to the initial research questions, the children appear to have some knowledge of trees however they can be seen to have acquired more specific knowledge about trees and their care during this research. Any knowledge they did have concerning tree care could be related to transferable skills that have been picked up by the schools allotment club and class allotment or the schools gardening in their production of plants. Also learning appears have taken place out of school from parents, guardians etc, this comment is initiated from the children growing apple pips at home. It appears that their physiological needs and some maintenance requirements are also understood, but question 3 asking the children to draw and label a tree suggest they are aware of the physical appearance of a tree but do not know what each part of a tree. They are aware that trees contribute to sustainable development in a practical way at this time but do not have a deeper understanding of environment and sustainability at this stage in their lives.

The schools ESD appears in my opinion to have made an important contribution to the children gaining knowledge of trees. They are aware that trees are used in the production of paper and that paper needs to be reused / recycled. They are aware that many food items are grown on trees and that they contribute to providing the planet with air to breathe. It is difficult to talk about sustainability without at some time talking about trees and their by-products, therefore the schools ESD has contributed to the children gaining knowledge and understanding of trees and that trees contribute to sustainability. This knowledge is at present in an embryonic state and concerted effort has to be made to consolidate and build upon this knowledge to ensure that the children continue to practice sustainable behaviour and gain a deeper more meaningful life style.

G. The Bigger Picture

Under New Labour's government, the eight doorways to sustainability was introduced. Bonnett (2003) argued that any policy drawn up for sustainability had to firstly define exactly what sustainability is and what it was hoping to achieve. I would agree with this argument, as it is difficult to achieve your aims unless you know what these aims are. If they are not defined then many differing versions of sustainability learning will be presented to the learners. This could cause confusion and misunderstanding amongst learners, which would ultimately not achieve the desired outcome or at best produce differing versions and standards for sustainability. The researcher finds it difficult to see how significant and speedy progress can be made with ESD without strong and specific definition and direction. Not doing so will be time lost. Huckle (2008) argued upon four reasons why he believed New Labours eight doorways had failed. Firstly the rise of the business school and the competition within the schooling system, secondly the increase of privatization of school services and the building of schools using private money which appear in some part to have been inefficient from both a time and financial point, thirdly the critical academic diversions of taught subjects and lastly the unhelpful guidance offered for ESD and that the diversions between politics and SD. I would agree with Huckle to a certain degree that the systems of competition and privatization at face value do appear not to promote sustainability, however if stronger understanding of the closed loop thinking system as described by Webster & Johnson (2008) was attained by all then some advancement could be seen. I will further comment on these points later.

It appears to me from my experience in industry and as a member of this society that society in general does not have the tools or energy to deal with real sustainable development. It is not just a case of teaching it to school children but industry and society in general has to be educated also. What we are producing as far as sustainable

development is concerned at this time is a token offering; we need more direction, support and action.

The national curriculum in England needs to set at its heart the need for all subjects to have sustainability running through them and critical to its outcome would be the need to have critical thinking as argued by Huckle (2010). Before this can be started a greater definition of sustainability has to be created so society is all working together in the right direction, especially for the national curriculum. The closed loop thinking system would be a suitable starting point for the above., Based on a natural system, it can provide a revolutionary new beginning. Emphasis must be placed on local initiatives, so increasing sustainability. Regular checks to prescribed standards for schools could ensure that ESD was meeting its requirements. Contrasts between privatisation, competition and politics need to be reconciled and have the need for sustainability as its base point, ensuring that nothing can be achieved without building it on a sustainable foundation. The recent global effects of the banking crisis are the perfect example of what happens when systems are not built on a sound sustainable foundation, with a few benefiting hugely whilst the majority will pay the price for years to come.

Highlighted throughout this research are the benefits to the individual if they connect with the natural world and live and breathe sustainability. The younger this is embedded in their way of life, the more it is understood and consistently practiced. This can make them become a valuable and cherished member of society. The summer of 2011 saw the UK riots take place. The rioters here in the majority described as disaffected young people, with some claiming they just wanted stuff – driven by personal gain with no consideration for anyone or anything apart from themselves. I suggest that if these young people had stronger discipline and respect from an early age and learned to value themselves and the

environment then there would have been fewer of them on the streets during those summer evenings. Is society now going to attempt to ensure that there is no repeat with the next generation? Is society going to use ESD to deal with these problems in an integrated manner? I hope so, it is clear to me that ESD has a valuable role in producing outstanding citizens for the future.

The starting point for my desire to commence this research was to discover why we as a nation know so little about how to care for and sustain trees that grow around us. The reality and the end of this research is that whilst that knowledge appears to be increasing from sustainable learning, it is well below a standard that will ensure that the planet is cared for in a sustainable manner. This could be achieved if governments took quicker, stronger and correct sustainable action for the benefit of all living now and for all who may come along in the future. If stronger action is not taken, the idea postulated by Elshof (2009) in The Age of Stupid could become a reality.

V. <u>Conclusion</u>

The main aim of this research study is to investigate the following questions:What do key stage 2 children know about the physiology, physiological needs and maintenance of trees in the urban environment?

What do children understand about how trees contribute to a sustainable environment?

How the schools education for sustainable development contributes to the children's knowledge of trees and trees contribution to sustainable development?

Initially a questionnaire was presented to the children that would produce both quantitative and qualitative results. The questionnaire supplied to the twenty five children had eight questions relating to the research's desired outcomes. Each child had the opportunity to provide the answers they felt most appropriately matched their level of understanding and knowledge. The questions selected were both structured and semi structured. The next stage was to carry out a more practical activity of planting a tree with the children. This could be viewed as action research in its delivery as findings where immediately used by the researcher to be passed back to the children. The session was also carried out ensuring all of the children had an opportunity to take an active role. This is viewed by the literature cited to be beneficial to gaining a better understanding of the natural environment. The next stage was to hold two focus groups, one with the children and the other with the children's teachers, learning assistants and other adults who help out with the children's learning and had significant experience with the children in the research.

The children's focus group consisted of two groups each containing two children. This approach would permit the researcher to ask deeper questions and questions that would

clarify answers that were not always clear in their inital questionnaire response. This would provide a better understanding to be sought and found from the answers that were supplied from the questionnaires. The adult focus group consisted of 5 adult members who were supplied a number of questions before the group met so allowing them time to read the questions, reflect and think about them and supply a considered response. This response would then supply their understanding of the knowledge and understanding the children held concerning the answers to the research questions.

A. A summary of the outcomes of the literature review

The literature review investigated the learning that takes place by school children that has links to the natural environment. The suggestions were that children benefited personally (through the gaining of self esteem, ownership etc) as well as the community who are around them by gaining knowledge of sustainable and green issues as young as possible so it became embedded. The community gained by the knowledge gained being enthusiastically transferred to other family members and important adults in the children's lives.   It also showed that this learning was better understood and had more practical meaning by the experience of learning in green environments like local parks, school grounds, nature and natural areas.

The use of knowledgeable environmental facilitators also paid high returns by them being able to transfer their enthusiastic knowledge delivered in a way and in language that the children could utilise.

 It is also important to highlight that the literary review highlighted the need for people to learn about environmental issues as early as possible. The younger the learner the better it is for them and for society. This enables the understanding and knowledge gained by

environmental views to become more ingrained and natural for them to understand and build upon as they grow up and mature.

It was also suggested that as society becomes more drawn to live in urban environments then it becomes more important to have access to the natural environment for the experience, knowledge and understanding that is required to nurture and respect it.

Understanding how the children had benefited by this green and natural learning could be observed by getting the children to draw what they understood. This had been demonstrated by the experience they had from drawing pictures before and after a visit to the Eden project. Before the pictures had vegetation in them but somewhere representative of British green environments and some had animals out of scale with the environment. After the visit the vegetation matched what had been seen and the animals drawn where fewer and in scale with their surroundings.

One way to also gain better knowledge of sustainable learning was to have it delivered in cross curriculum ways. Evidence was presented in the literature that compartmentalization of the understanding of sustainability occurs with children when they are taught the subject in just limited areas of the curriculum. It was also argued that the curriculum needs to be re-evaluated to ensure that it does have sustainability learning running through it.

Further research also informed that children also need to firstly be provided with sustainable learning from a position that the children's present level of knowledge and understanding is, and not from the position where the educators believe it to be.

It was also argued that industry had a stronger role to play in educating children about sustainability. The benefits of these are that children observe that sustainability is central to

everything that is carried out in society, be it at school, in a natural environment or in industry. One review of the literature related the production of a film to that of the acts undertaken by man at this time. The film was called The Age of Stupid and told how a species overuses its resources. The author went on to relate this to ESD teaching and in particulate geography. He claims that this is based on the fact that teaching is about equipping learners with industry standards and has not provided enough critical ethical thinking about social cultural and ethical dimensions of sustainability.

Finally there is also a need to move on with ESD from what was described as ESD1 to ESD2. This would lead to critical thinking by learners to ensure a deeper more meaningful understanding of sustainability issues.

B. A summary of the findings of the research objective

The researcher would argue that the children held and demonstrated a good level of practical activities they could carry out to make a significant contribution to sustainability. These practices included, recycling paper, glass, metal, turning off taps, reusing items where possible, turning off lights and electrical equipment when not required. However they did not at this stage of their lives have a fully and coherent understanding of the terms, 'environment' and 'sustainability' and the full implications if sustainability practices are not undertaken. The knowledge gained to carry out such practices has been learned not only from direct school learning, but from visits to green environments to learn, by using knowledgable environmental educators, by having motivated and enthusiastic staff, by parents, guardians and family members, by TV and by after school groups

The researcher would also argue that arboricultural knowledge had been acquired by the children. This knowledge had been gained by in the main part by the attendance at the after

schools allotments and gardening clubs and to a greater extent by the class allotments that had at first been at a local allotment site and subsequently by the creation of allotment growing beds in the school grounds and the planting of trees also in the school grounds. However knowledge appears to have also been gained by the children from parents, guardians and older family members and to a lesser extent by school visits to green environments and by their observations. This arboricultural knowledge in the main part appears to have been knowledge that was transferred from existing plant knowledge. It could be argued if the researcher had not provided the questionnaire about trees the children may not have ever transferred this knowledge to the area of research under this study and accordingly it could have been accepted they had no arboricultural knowledge. It could therefore be considered that this research has instigated an important sustainability thinking process with the children. It was also observed by this researcher that the presence of him at the school could have facilitated more inquisitiveness from the children concerning trees, the role they play in sustainability and the trees physiology and physiological needs. Similarly the maintenance requirements of trees that the children held as knowledge related to what they had gained by the above activities they had carried out with the adults at the allotment and gardening club.

The children's level of knowledge to how trees contribute to sustainability appears to be in its infancy. They have a good understanding of the practical activities they must do to preserve resources, e.g. recycle paper as one example; however no direct findings located that practice to the trees that grow in and around the school environment or the children's wider personal environment.

C. Recommendations linked to the conclusion and suggestions for further research

It is recommended that ESD teaching should continue not just at its present level but increase exponentially over the coming years until it is the foundation and core of all learning, in fact, the sooner the better. It is imperative it is not forgotten by the global economic crisis that engulfs society at this time.

The immediate action that is required is firstly, ESD should be defined more precisely at policy level so that a clear and united national (and international) approach to it can be taken. ESD needs to become a central theme in all subjects in the national curriculum so enabling a sustainable society to be built. It should not be solely driven by the acquisition of wealth without a solid foundation built on or systems similar to closed loop thinking. Further research should be carried out to support policy definition for ESD, on the closed loop thinking and similar all encompassing approaches to leading a more sustainable lifestyle. The effects of ESD through differing key stages should be further investigated with specific reference to how local trees rather than just a focus on global trees are perceived and their physiology, physiological needs are met and the level of knowledge required for their care investigated.

 It would also be valuable to look at other schools within the same area that come from differing social economic backgrounds. The school in this research was generally describes as broadly average and it would be informative to research at schools that could be described as below or above social economic average. This could be also spread further to other western and developed and developing societies to measure the rate of development of ESD in other countries. Similarly research at schools that do not have at this time

allotment or gardening learning would be very informative as to the level of ESD the children hold there. In the opposite of the previous, schools that have embraced ESD more strongly and use cross curriculum to teach it would be valuable to carry out research at.

D. Limitations to the research

The sample group used was small and just in one school. If the research was to be carried out in another school in a differing area the results could be notably different, therefore results may not always be generally accepted, except where other readers and researchers can see their application.

E. Implications and Recommendations for Practice and Policy

The implications for practice are that whilst in the school were the research was carried out there appears to be the foundation of some notable ESD, this needs to be significantly built upon not just by the UK but around the world if society is to achieve SD. The literature review gave many examples of using the natural environment, knowledgeable educators to start teaching this to children as early as possible and the benefits it brings, however under the present governments cuts in spending in their approach to the present economic crisis, funding to schools has significantly decreased. This undoubtedly will have had an effect on the possibility for learning in green environments and using knowledgeable educators. Despite the above a way to continue ESD needs to be found both in practice and in policy, in fact it needs to be central to both. In the wider political arena at this time it would appear to many observers that SD is not that important but the reality is that it has never been more important. Many have fears that SD will be forgotten as western countries deal with their

debt. However unless a more selfless approach to society is produce through policy and

practice we will just once again begin the cyclic system of economic ups and downs with

very few environmental benefits generated.

VI. Appendix – Focus Groups' Questionnaire

1. How do we get trees in our city?

2. Do the trees in the school grounds need to be taken care of as they grow and age? If so how and who does it?

3. Draw a tree. Name each part and what they do.

4. We can see the above ground parts of a tree, like the branches and leaves, but how far underground do the roots grow?

5. Do trees help with the environment and if so how?

6. What do you think the word sustainable means?

7. Can trees help with sustainability and how?

8. Can you think of any other things that can help with sustainability?

VII. <u>References</u>

about.com (n.d.) How Does Eating Locally Grown Food Help the Environment? Retrieved 20 March 2010, from
http://environment.about.com/od/greenlivingdesign/a/locally_grown.htm

Adèr, H. J., Mellenbergh, G. J., & Hand, D. J. (2008). Advising on research methods: A consultant's companion. Huizen, The Netherlands: Johannes van Kessel Publishing.

Agenda 21: The Earth Summit Strategy to Save Our Planet, (1993) <u>Element Books Ltd.</u>

Ali I. (2002). Kenyan Children's Ideas about Parks and Wildlife Environmental Education Research, Volume 8, Number 4, 1 November 2002 , pp. 439-462(24)

Allan, (2003) "A critique of using grounded theory as a research method," Electronic Journal of Business Research Methods, vol. 2, no. 1

BBC (2009) More than 200 people rescued in floods in Cumbria town. Retrieved 20 March 2010, from http://news.bbc.co.uk/1/hi/8366360.stm

 Ballantyne and Packer (2008). Introducing a fifth pedagogy: experience-based strategies for facilitating learning in natural Environmental Education Research, Volume 15, Number 2, April 2009 , pp. 243-262(20)

Bell, J. (2005). Doing your research project: a guide for first-time researchers in education and social sciences. Maidenhead: Open University Press.

bobvila.com (2010) Reduce Heating Bills with Energy Efficient Landscaping. Retrieved 20 March 2010 from
http://www.bobvila.com/HowTo_Library/Reduce_Heating_Bills_with_Energy_Efficient_Landscaping-Energy_Efficient_Products_and_Technologies-A2395.html

Bonnett, M. (2002) 'Education for Sustainability as a Frame of Mind' in Environmental Education Research Vol. 8 (1) pp. 9-20.

Bowker (2007) Children's perceptions and learning about tropical rainforests: an analysis of their drawings Environmental Education Research. Volume 13, Number 1, February 2007 , pp. 75-96(22)

The British Wood Pulp Association (2010) Source of Fiber. Retrieved 20 March 2010 from http://www.bwpa.org.uk/sourcesoffibre.html.

Cohen, L. Mansion, L. and Morrison, K. (2007). Research Methods in Education. London. Routledge.

Colorado State University (2011) Writing @ CSU. Retrieved 14 May 2011 from http://writing.colostate.edu/guides/research/casestudy/pop2a.cfm.

Colorado Tree Coalition (n.d.) Benefits of Trees in Urban Areas. Retrieved 20 March 2010 from http://www.coloradotrees.org/benefits.htm

Communities and Local Government, Planning Building and the Environment, Planning Policy Guidance 3: Housing (Cancelled)(n.d) Retrieved 02 February 2010 from

http://www.communities.gov.uk/archived/publications/planningandbuilding/planningpolicy guidance

Communities and Local Government, Planning Building and the Environment (Planning Policy Statement 3 (Housing) (n.d). Retrieved 02 February 2010 from http://www.communities.gov.uk/publications/planningandbuilding/pps3housing

Communities and Local Government, Planning Building and the Environment, Planning Policy Statement 9: Biodiversity and Geological Conservation (n.d) Retrieved 02 February 2010 from http://www.communities.gov.uk/publications/planningandbuilding/pps9

City of York Council (2011) Council and Democracy. Retrieved 31 November 2011 from http://democracy.york.gov.uk/mgFindCouncillor.aspx?XXR=0&AC=WARD&WID=351

Denscombe, Martyn (2007) Good Research Guide. Buckingham, GBR: Open University Press.

Devine-Wright Patrick ; Devine-Wright Hannah ; Fleming Paul, (2004) Situational influences upon children's beliefs about global warming and energy. Environmental Education Research, Volume 10, Number 4, 2004 , pp. 493-506(14)

Drever, E. (1995). Using Semi-Structured Interviews in Small-Scale Research, Edinburgh, The Scottish Council for Research in Education.

East Riding of Yorkshire Council (1999) Boothferry Borough Local Plan Adopted April 1999. Booklet. East Riding of Yorkshire Council.

East Riding of Yorkshire Council (1999) East Yorkshire Borough Wide Local Plan Adopted April 1999. Booklet. East Riding of Yorkshire Council.

East Riding of Yorkshire Council (1999) Holderness District Wide Local Plan Adopted April 1999. Booklet. East Riding of Yorkshire Council

Education for Sustainable Development in the National Curriculum. Retrieved 03 February 2010 from http://www.esd.rgs.org/link9.html

Education for Sustainable Development in the UK (2010): UK National Commission for UNESCO ESD Co-ordinating Group. Retrieved 05 February 2010 from http://www.eauc.org.uk/from_the_chair_of_uk_national_commission_for_un

Elshof, L. (2009). Transcending the Age of Stupid: Journal for Activist Science & Technology Education, 1(1), p. 54.

Energy Saving Secrets (2010) Greenbelt land: the big debate. Retrieved 24 January 2010 from http://www.energysavingsecrets.co.uk/greenbelt-land-the-big-debate.html

The Environmental Association for Universities and Colleges, Embedding sustainable development in the curriculum. Retrieved 20 February 2011 from http://www.eauc.org.uk/sorted/files/esd-embedding_1.pdf

Fern (n.d) What are Carbon Sinks? Retrieved 20 March 2010 from http://www.fern.org/campaign/carbon-trading/what-are-carbon-sinks

Fisman (2005) The Effects of Local Learning on Environmental Awareness in Children: An Empirical Investigation The Journal of Environmental Education   Issue: Volume 36, Number 3 / Spring 2005

The Free Dictionary (2011) Environment definition. Retrieved 06 August 2011 from http://www.thefreedictionary.com/environment

The Free Dictionary (2011) Sustainability definition. Retrieved 06 August 2011 from http://www.thefreedictionary.com/sustainable 2

Garden Organic (2010) Save Our Gardens. Retrieved 2 February 2010 from http://www.gardenorganic.org.uk/saveourgardens/

Green Tree Community Health Foundation (n.d.) Retrieved 20 March 2010 from http://www.greentreecommunityhealth.org

Guildford Borough Council (2010) Changes to planning regulations from 1 October. Retrieved 12 January 2010 from http://www.guildford.gov.uk/GuildfordWeb/News/newplanningregulations.htm

Heating and Ventaliting.com (n.d.) York City Council opts for Hoval's renewable. Retrieved 20 March 2010 from http://www.heatingandventilating.net/news/news.asp?id=6158

Hoffman, Morales & Wallach (2007) Gardening Activities, Education, and Self-Esteem: Learning outside the Classroom. Urban Education, 2007, vol. 42, no. 5, Retrieved 13 August 2011 from http://www.datastarweb.com.ezproxy.york.ac.uk/EDUCAT/20110813_094537_1c4c_3/WBFORM/16001/5526c367/

Home of Carbon Management (2010) What is a carbon footprint? Retrieved 20 March 2010 from http://www.carbonfootprint.com/carbonfootprint.html

Honey, P. & Mumford, A. (2000). The learning styles helper's guide. Maidenhead: Peter Honey Publications Ltd.

Huckle (2006) Education for Sustainable Development, A briefing paper for the Training and Development Agency for Schools. Retrieved 30 May 2011 from john.huckle.org.uk/.../Education%20for%20Sustainability,%20an%20invitation%20to%20join%20a%20debate.doc

Huckle (2008) An Analysis of New Labour's Policy on Education for Sustainable Development (ESD) with Particular Reference to Socially Critical Approaches, Environmental Education Research, 14/1, February 2008, pp. 65 - 75

Huckle (2008) (Chapter 26 in Arthur, J., Davies, I. & Hahn, C. (eds.) The Sage Handbook of Education for Citizenship and Democracy, London, Sage Publications, 2008, pp. 342 – 354.

Huckle (2009) 'Sustainable schools: responding to new challenges and opportunities', *Geography*, 94/1, Spring 2009, pp. 13 – 21.

Huckle (2010) ESD and the Current Crisis of Capitalism: Teaching Beyond Green New Deals', Journal of Education for Sustainable Development, 4/1, 2010, pp. 135 – 142.

Journey to Forever (n.d.) Trees Soil and Water. Retrieved 20 March 2010 from http://www.journeytoforever.org/tree.html

Kitzinger (1995) Qualitative Research: Introducing focus groups. Retrieved 06 August 2011 from http://www.bmj.com/content/311/7000/299.full

Littledyke M. (2004)Primary children's views on science and environmental issues: examples of environmental cognitive and moral development Environmental Education Research, Volume 10, Number 2, May 2004 , pp. 217-235(19)

London Borough of Hackney (2008) A Strategy For Parks In Hackney. Retrieved 20 March 2010 from http://www.hackney.gov.uk/parks-strategy.pdf

Loughland T; Reid A.; Walker K.; Petocz P.(2003) Factors Influencing Young People's Conceptions of Environment Environmental Education Research, Volume 9, Number 1, 1 January 2003 , pp. 3-19(17)

Malone (2004) 'Holding Environments': Creating Spaces to Support Children's Environmental Learning in the 21st Century Australian Journal of Environmental Education Volume 20 Issue 2 (2004)

Milne R (2010) Healey calls on councils to use their powers to stop 'garden grabbing' Planning Portal. Retrieved 7 February 2010 from http://www.planningportal.gov.uk/england/professionals/news/archive/2010/jan/2010-01-week-3/210110_1

Monash University (2009) Driving green saves fuel and environment. Retrieved 20 March 2010 from http://www.eng.monash.edu.au/news/shownews.php?year=2009&nid=27

Mortgage Guide UK (2009) Government Housing Targets [UK]. Retrieved 13 January 2010 from http://www.mortgageguideuk.co.uk/blog/uk-housing-market/government-housing-targets/

Munn, P. & E. Drever (1995). *Using Questionnaires in Small-scale Research* (revised edition). Edinburgh: Scottish Council for Research in Education.

Myers Jr, Olin; Saunders Carol; Garrett Erik (2004) What do children think animals need? Developmental trends, Environmental Education Research Volume 10, Number 4, 2004 , pp.

The National Curriculum: Handbook for Primary Teachers in England: Key Stages 1 and 2 (1999) London, Department for Education and Employment and Qualifications and Curriculum Authority.

O'Brien L (2009) Learning Outdoors: The Forest School Approach. Education 3 13, Feb 2009, vol. 37, no. 1, Retrieved 13 August 2011 from http://www.datastarweb.com.ezproxy.york.ac.uk/EDUCAT/20110813_094537_1c4c_3/WBDoc17/10001/f5ecd14b/

Ofsted Publications and Reports (2003) Taking the First Step Forward Towards an Education for Sustainable Development. Retrieved 05 February 2011 from http://www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Documents-by-type/Thematic-reports/Taking-the-first-step-forward-towards-an-education-for-sustainable-development

OFSTED (2010) The Annual Report of Her Majesty's Chief Inspector of Education, Children's Services and Skills 2009/10 Main summary, Manchester. Retrieved 20 February 2011 from http://www.ofsted.gov.uk/publications/annualreport0910

Planning Portal (n.d.) City of York, York Development Control Local Plan. Retrieved 2 February 2010 from http://www.planningportal.gov.uk/wps/portal/genpub_DevelopmentPlans/?PpAction=select_document&select_type_id=120&select_object_id=1115312746796&text_category=&select_loc=

Planning Portal (n.d.) Common Projects Extensions. Retrieved 7 February 2010 from http://www.planningportal.gov.uk/england/public/buildingwork/projects/workcommonextensionreal/

Qualters (2010) Making the Most of Learning outside the Classroom. New Directions for Teaching and Learning, Win 2010, no. 124. Retrieved 13 August 2011 from http://www.datastarweb.com.ezproxy.york.ac.uk/EDUCAT/20110813_113513_e2790_8/WBDoc27/11001/8b5d21b7/

Raintree Nutrition (n.d.) The Disappearing Rainforest. Retrieved 20 March 2010 from http://www.rain-tree.com/facts.htm

Rovira M.(2000). Evaluating Environmental Education Programmes: some issues and problems. Environmental Education Research, Volume 6, Number 2, 1 May 2000 , pp. 143-155(13).

Self Build ABC, (2010) Brownfield Sites. Retrieved 19 January 2010 from http://www.selfbuildabc.co.uk/brownfield-site.asp

Shade Trees and Biodiversity in the Urban Environment (n.d.) What is Biodiversity? Retrieved 20 March 2010 from http://shade-trees.tripod.com/biodiversity.html

Strong (1992), Essay, From Stockholm to Rio: a journey down a generation. Retrieved 20 March 2010 from http://en.wikiquote.org/wiki/Maurice_Strong

Suite101.com (n.d.) Environmental Benefits of Trees Retrieved 20 March 2010 from http://reforestation.suite101.com/article.cfm/environmental_benefits_of_trees

Teachernet (2009) Sustainable Schools: The Eight Doorways. Retrieved 20 March 2010 from
http://www.teachernet.gov.uk/sustainableschools/about/about_detail.cfm?id=52&levelselected=2

UNESCO Education for Sustainable Development (1995-2010) Retrieved 5 February 2011 from http://www.unesco.org/en/esd/

Vare and Scott (2007) Learning for a Change: Exploring the Relationship Between Education and Sustainable Development. Journal of Education for Sustainable Development 2007; 1; 191.

Webster & Johnson (2008) Sense & Sustainability - Educating for a circular economy. Retrieved 20 March 2010 from https://emf.s3.amazonaws.com/S%26S_2010C.pdf

Wikipedia (2011) Agenda 21. Retrieved 19 February 2011 from http://en.wikipedia.org/wiki/Agenda_21

Wikipedia (2011) Kyoto Protocol. Retrieved 19 February 2011 from http://en.wikipedia.org/wiki/Kyoto_Protocol

Wikipedia (2011) Observational Techniques. Retrieved 26 May 2011 from http://en.wikipedia.org/wiki/Observational_techniques

Wikiquote (2011) Maurice Strong. Retrieved 3 February 2011 from http://en.wikiquote.org/wiki/Maurice_Strong

The World Bank (u.d) ROADS AND THE ENVIRONMENT: A HANDBOOK, Part I The Environmental Assessment Process. Retrieved 23 September 2011 from http://siteresources.worldbank.org/INTTRANSPORT/Resources/336291-1107880869673/chap_1.pdf

Young & Barrett (2002) Adapting visual methods: action research with Kampala street children. Retrieved 27 May 2011 from http://onlinelibrary.wiley.com/doi/10.1111/1475-4762.00017/abstract