

# CONNECTING RESEARCH AND PRACTICE: EDUCATION FOR SUSTAINABLE DEVELOPMENT

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## CONTENTS

Acknowledgments	3
1. INTRODUCTION	4
2. USING RESEARCH IN PRACTICE	7
2.1 Using Research in the Primary School	9
2.2 Using Research in the Secondary School	16
2.3 Using Research in Outdoor/Community Settings	22
3. GUIDANCE ON USING RESEARCH	28
4. CONCLUSIONS: key messages and their implications	32
5. REFERENCES AND OTHER INFORMATION SOURCES	33

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It can be accessed at: <http://www.nfer.ac.uk/eur>

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## 1. INTRODUCTION

### **What is this document about?**

This document is about making connections between research and practice in relation to education for sustainable development (ESD). It tells the stories of seven practitioners who have made use of research findings in their own school or outdoor centre over the last year. It provides:

- ♦ case studies of research-practice links in primary, secondary and outdoor/community settings (Section 2);
- ♦ a four-step process to show how practitioners can make use of research in their practice (Section 3);
- ♦ a summary of the project's key messages and their implications (Section 4);
- ♦ links to other sources of information, relating both to ESD and to research (Section 5).

We hope that it will be useful to:

- ♦ practitioners interested in using research to develop their ESD practice;
- ♦ practitioners and researchers interested in exploring connections between research and practice, and undertaking user reviews;
- ♦ teacher educators, LEA advisors, and policy-makers with a responsibility for supporting practitioner engagement with research as part of professional learning.

### **What is Education for Sustainable Development (ESD)?**

ESD forms part of the rationale for, and the content of, the current National Curriculum in England. Schools are required to 'develop [pupils'] awareness and understanding of, and respect for, the environments in which they live, and secure their commitment to sustainable development at a personal, local, national and global level' (QCA, 1999:11).

The practitioners in this project saw ESD as:

'a method to reintroduce awe and wonder into the curriculum';

'being about lifestyle changes';

'concerned with the socio-economic and political as well as the environmental';

'an essential element of the geography curriculum';

'an entitlement for all children, especially those in inner city areas'.

More details about ESD can be gained from the information sources in Section 5.

**Who produced this document?**

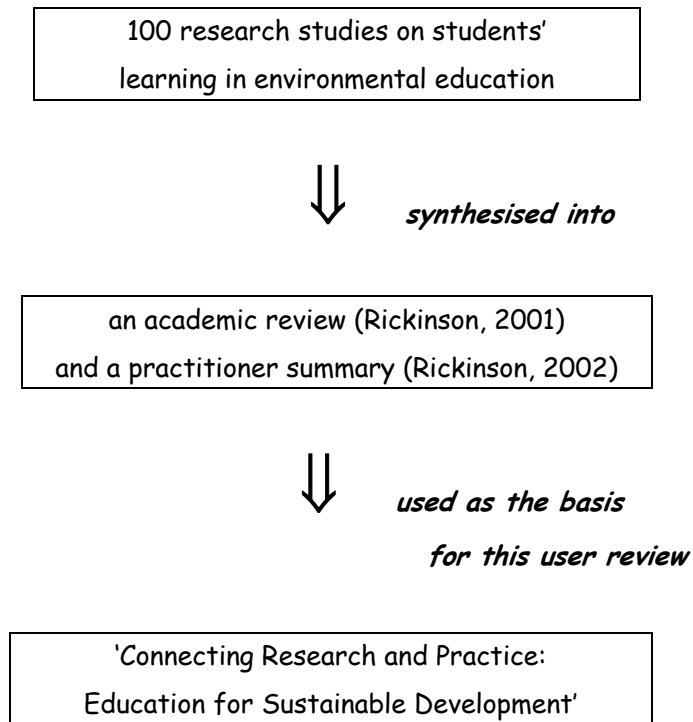
It was written collaboratively by an NFER researcher: Mark Rickinson, and seven practitioners: Celia Aspinall, Andy Clark, Lara Dawson, Sandra McLeod, Prue Poulton, Jim Rogers, and Julia Sargent, all of whom had responded to an advertisement placed by the researcher in an environmental education newsletter.

These practitioners included three primary school teachers, two secondary school teachers, and two outdoor/community educators. They represented a range of institutional contexts, geographical locations, career stages, and subject backgrounds. Their stories are told in Section 2.

**How was this document produced?**

The starting point for the project was an academic review of research on environmental learning, which brought together the findings of over 100 research studies (Rickinson, 2001: 'Learners and learning in environmental education: a critical review of the evidence', *Environmental Education Research*, 7, 3, 207-321). In order to make the findings of this review more accessible to practitioners, it was decided to undertake a 'user review' (Figure 1). A user review is described as 'a document that arises from an academic review, but is devised and written by researchers and users working together' (Bassey, 2000:25).

**Figure 1: The User Review Process**



The project was stimulated and supported by the National Foundation for Educational Research in England and Wales, the British Educational Research Association, and the General Teaching Council of England.

## 2. USING RESEARCH IN PRACTICE

This section presents the practitioners' case studies about making connections between ideas in the research review and their everyday practice.

### How were the case studies developed?

The practitioner case studies were developed over a one-year period. The steps involved are described in more detail in Section 3. Very briefly, the process involved the practitioners in:

- ♦ thinking about their practice and identifying questions to ask of research;
- ♦ reading the review of research and identifying ideas that might relate to their practice;
- ♦ trying to use these research ideas within their own school/centre;
- ♦ reflecting on what they had learnt and how this might develop further.

### What kinds of research-practice connections are described?

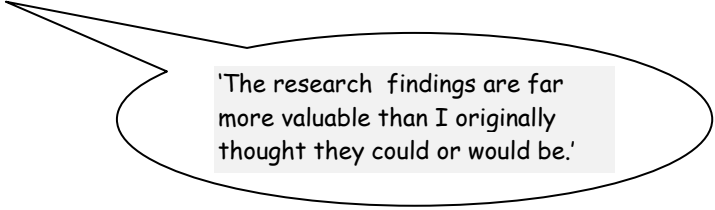
The practitioners used ideas from the research review in a variety of ways depending upon their individual situations and interests. Across the seven case studies, there were six main types of research use.

Type of research use	Primary Schools			Secondary Schools		Outdoor/Community Settings	
	Case Study 1	Case Study 2	Case Study 3	Case Study 4	Case Study 5	Case Study 6	Case Study 7
To support/ justify practice	✓	✓	✓			✓	✓
To challenge practice				✓	✓	✓	
To reflect on practice		✓	✓	✓	✓		✓
To investigate practice		✓		✓	✓	✓	
To change practice		✓		✓	✓		
To inform future practice	✓		✓			✓	

**What did the practitioners gain from this process?**

- **A sense of confidence**  
'The research supported our concerns for a broader, enriching curriculum. I realised that the school had many practices already in place which supported aspects of the research.'
- **New ideas about teaching and learning**  
'Reading the research has affected my teaching, and made me think more deeply about my practice.'
- **Changes in classroom practices**  
'This has led to me: questioning students a lot more to test their understanding; and spending more time circulating around my classes and talking to individuals about their understanding of the work.'
- **Insights into recurring difficulties**  
'Having read the research, particularly those parts which refer to the teaching and learning of ESD in inner city areas, some of the reasons for our lack of influence become more apparent.'
- **Justifications for current work**  
'This project has given me quotable evidence to use when approaching new schools'
- **Priorities for future work**  
'The research has pointed us towards various criteria which we must address in order to make the teaching and learning of ESD successful and worthwhile'
- **Ongoing questions and challenges**  
'The process of reflecting on my practice has been very valuable, and from this questions and challenges are still steering my teaching.'

It is important to stress that most of these benefits were way beyond initial expectations:



'The research findings are far more valuable than I originally thought they could or would be.'

**How might these case studies be of help to other practitioners?**

We hope that these case studies will be helpful for other practitioners in terms of:

- showing ways in which research findings can be used by practitioners
- highlighting recent research findings that may be relevant to their contexts
- providing insights into the process of trying to use research to develop practice.

## 2.1 USING RESEARCH IN THE PRIMARY SCHOOL

The three primary school teachers used ideas from the academic research review (Rickinson, 2001) in different ways.

**Celia Aspinall (Case Study 1)**, at a primary school in Hampshire, found that the research provided ideas to support her school's desire to 'develop the curriculum across all areas through more investigative and creative learning'. Through reading the review, she came to realise that her school was already implementing a number of practices that connected with ideas in the research, and that there were opportunities for future development.

**Andy Clark (Case Study 2)**, in Ashton-under-Lyne, was interested in reading the research to find out if it supported his beliefs about the benefits of ESD for primary children. However, what came out of the process was more about raising questions than providing justifications. As he explains, the research led him 'to reflect on what I was doing and how I do it'. This had implications for his classroom teaching and his delivery of in-service training (INSET).

In her case study, **Sandra McLeod (Case Study 3)** from Hackney shows how research can help to explain some of the difficulties experienced in developing ESD in an inner city context. As she explains: 'Having read the research, some of the reasons for our lack of influence became more apparent'. As well as this, Sandra discusses how research findings will inform the implementation of a new waste action project under development in her school.

### **CASE STUDY 1: USING RESEARCH TO SUPPORT THE DEVELOPMENT OF ESD IN THE PRIMARY SCHOOL CURRICULUM**

*Celia Aspinall, Year 1/2 teacher, Buryfields Infant School, Odiham, Hampshire*

As well as being a class teacher, I am responsible for mathematics, geography, and the school grounds. Our school is currently trying to develop a more holistic approach to the curriculum through investigative and creative learning. The objective is to widen pupils' horizons and, thus, promote self awareness, empathy, social skills and motivation.

### **What did I get from reading the research?**

In reading the review, I was interested to see if there was anything that could help with our efforts to develop a more holistic approach in the curriculum. I found several supportive ideas, such as:

- *'young people see television and school as the two most important sources of their environmental information'*<sup>1</sup>(p. 246);
- *'it is the beliefs and practices of environmentally motivated teachers which are the most significant elements in promoting young people to undertake environmental action'* (p. 261).

I was also interested that research suggested:

- *'it is necessary to work simultaneously with the child and the adult to support both the children and adults in the catalytic process'* (p. 286) ;
- *'teaching about environmentally responsible actions without considering why they are beneficial can increase young children's misconceptions'* (p. 238).

### **How did I use this in my practice?**

I felt that the research supported our concerns and beliefs for a broader, enriching curriculum. I realised that the school had many practices already in place which supported aspects of the research. For example, we had made numerous enhancements to the school environment over several years (a nature reserve and pond, a human sun dial and children's gardens). We also hold bi-annual grounds days where adults and children undertake actions (such as clearing the pond, working in the children's gardens) to develop the grounds for future learning across the curriculum. The active nature of these activities and the involvement of children and parents connect with the research ideas above.

During this last year, we have also introduced some new initiatives:

- classes have been named after trees in the school grounds - each class is observing seasonal changes in their tree through cross curricular activities;
- class gardens, which had become somewhat neglected, are now being redeveloped as "hands on" teaching/learning areas.

Future plans include: the development of a school policy for ESD, and an emphasis on ensuring that ESD is integrated in subject curriculum maps. We see ESD as a method to re-introduce 'awe and wonder' into the curriculum. I feel these additions, again, support the research ideas outlined above.

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<sup>1</sup> Within the case studies, all quotes from the academic review (Rickinson, 2001) are given in italics along with a page reference

**What did I learn from the process?**

The work we are doing at our school is long term. During this year we are developing a new scheme of work. We are thinking of a number of issues for planning and developing the curriculum. While addressing National Curriculum orders and keeping on track with all necessary numeracy and literary targets, we intend to develop pupils to think creatively, and, most importantly, to solve problems and make a difference for the future.

We recognised a need to change our practice to include more ESD/environmental education and felt we could indeed justify our desire to develop the curriculum further as a group of professionals. The significant area we are working on for ESD must engage children to see a purpose and relevance for their teaching and learning. The children need to value other people's contributions and learn from them. They need to be involved in projects relevant to their circumstances and areas of learning appropriate to their age.

**CASE STUDY 2: USING RESEARCH TO RAISE QUESTIONS ABOUT ONE'S OWN ESD TEACHING PRACTICES**

*Andy Clark, Year 1 teacher, Canon Burrow's CE Primary School, Ashton-under-Lyne, Tameside*

The school I work in is a Beacon School with a strong focus on environmental education. I am the school's Environmental Coordinator and am committed to the promotion of ESD.

My own experience has shown me that many children who have had the opportunity to be involved with sustainable development work at school develop positive attitudes to school. They feel proud of their school, are often responsible and act respectfully because they believe they are contributing. This can mean that because of enhanced motivation they perform well at school too.

**What did I get from reading the research?**

I entered into this project hoping that the research review would support the ideas outlined above. If this were the case, I was interested to find out if the research could help me in the teaching and promotion of ESD.

Whilst with all research it is difficult to come to a conclusive overall view, in my opinion the research was helpful. The key points that I found of interest were:

- educational intervention can change learners' environmental knowledge, attitudes and actions (p. 263), and children can influence the environmental behavior of their parents (p.285);
- young people appear to hold generally positive environmental attitudes (p. 254), but there are various specific issues that are of concern to students, and these issues, and the amount of concern for them, differ between individuals (p. 247-53);
- all children bring prior knowledge to lessons and this can be incorrect/confused (p.232), and teachers have to be aware of this when teaching;
- *'students are critical consumers, rather than passive recipients, of environmental curricula'* (p. 284);
- *'teaching about environmentally responsible actions without considering why they are beneficial can increase young children's misconceptions'* (p. 238).

#### **How did I use this in my practice?**

Reading the research has affected my teaching, and has made me think more deeply about my own practice. For example:

- The research showed that children have an interest in environmental issues, and have certain issues about which they are particularly concerned. This affected how I worked with two children preparing a talk with me for the Tameside Earth Summit. Together we explored what they wanted to say at the summit, and how best to present their ideas, rather than me teaching first about the subject and suggesting to them what they could say.
- The research has also helped me with giving talks about ESD to other teachers. It has helped me to be more confident because in the past I have felt the need to justify why one should teach sustainable development, whereas research shows that children are concerned and want to know more about these issues. Also knowing that audiences often have prior knowledge, and that the audience would be 'critical consumers', made me realise that I need to start sessions by finding out my audience's views, opinions and prior knowledge.

The research made me want to find out more about my own pupils to see if certain ideas from the research were confirmed at my school. For example, did the children have particular areas of interest; were they able to affect the behaviour of others? I had planned to do a questionnaire, but upon reflection and after referring to the research, decided to conduct a general discussion where I tried to let the children take the lead and I acted as facilitator to keep the discussion going.

This experience has shown me that:

- the best way to access the children's ideas is by discussion, rather than other methods such as questionnaires;
- children's responses in a discussion are influenced by who speaks first, and who leads the discussion;
- the immediate environment and particularly its visual impact is an important concern for children at our school;
- the children think they can make a difference and are not afraid to act upon this belief ("If I saw anyone drop litter I'd say to them to tidy it."), but are also aware that they are not always listened to ("I don't think adults listen to children").

#### **What did I learn from the process?**

Having had the opportunity to be involved with research, I believe it can and should play a part in teachers' professional development. It has helped me to:

- be open-minded in my thinking;
- engage with new and important ideas;
- reflect on what I was doing and how I did it, particularly in the area of using my own knowledge instead of seeking new knowledge to help me;
- learn from others, particularly those who come from different backgrounds; and
- consider new options and see change as being possible.

Perhaps most importantly for myself, being engaged with research has made me realise the crucial need for educators to take time to think through the best way of teaching students about issues before embarking on a course of action. It has made me have at the forefront of my thinking that different people learn in different ways.

Finally, it has made me believe that what I am trying to do is important.

#### **CASE STUDY 3: USING RESEARCH TO INFORM THE DEVELOPMENT OF A WASTE ACTION PROJECT IN A PRIMARY SCHOOL**

*Sandra McLeod, Year 3 teacher, Shacklewell Primary School, Hackney, London*

My school is an inner city primary school, and I am the coordinator for Humanities/ESD, school grounds and community involvement. For the past five years, we have tried, with varying degrees of success, to raise awareness of issues of sustainability among pupils, staff, parents and the wider community.

We have found, however, that although we may make *some* impression through projects such as building a high profile recycling centre, lobbying the council, holding open days and developing sustainable projects in the school grounds, we do not appear to influence attitudes enough to change the environmental behaviours of children, parents or even staff significantly.

### **What did I get from reading the research?**

Having read the research review, particularly those parts which refer to the teaching and learning of ESD in inner city areas, some of the reasons for our lack of influence became more apparent. Initially, and perhaps most significantly, research findings confirm that, for various reasons, there is less concern for the environment among inner city children than in other areas. For example:

*'Roper Starch Worldwide's (1994) survey of young people in the US found that concern about the environment relative to other social issues was significantly greater among the students from non-disadvantaged areas' (p.253)*

We also found confirmation of our belief/experience that many inhabitants of disadvantaged areas are more likely to be concerned about local environmental issues, such as litter and pollution than about global environmental issues.

On a more positive note, the review confirmed that *'studies of intergenerational influence suggest that students, after participating in environmental education activities, are capable of influencing the environmental attitudes and/or behaviours of their parents' (p. 289)*. An added proviso, though, asserted that:

*'Such influence, however, is not an automatic process, and appears to be facilitated by programmes being enjoyable for students, including tasks which can involve parents and dealing with actual local problems, in addition to students and parents having an interest in the environment and good communication patterns.'* (p.289)

### **How did I use this in my practice?**

Our school recycling scheme has recently not been as successful as it might have been. This is due partly to council cut-backs and partly to a decline in interest and momentum within the school community. We had considered an in-school approach to reviving interest and motivation, but were then given the opportunity to become part of a high-profile national scheme, Schools Waste Action Club run by WasteWatch.

This project promises to 'deliver a real reduction in waste produced' through active teaching and learning opportunities. By maintaining a high profile for the project through newsletters, presentations, events and photo opportunities, we will seek to involve and work closely with the wider school community to 'raise awareness and

understanding of waste management issues'. We expect the project to run during the current academic year.

The research has pointed us toward various criteria which we must address in order to make the project, as well as the teaching and learning of ESD, successful and worthwhile. These are:

- waste management issues should be introduced through local concerns such as litter and its disposal, in order to engage the interest of the whole school community;
- teaching and learning must be active, challenging and enjoyable, so that pupils are sufficiently motivated to pass on their knowledge and behaviours to others, particularly parents;
- communication between the school and the wider community about the project must be encouraged, through newsletters being translated into various first languages and news/activities being made available to those unable to come into school regularly.

The importance of these criteria has been borne out by our recent experience of trying to interest parents in contributing ideas for our quiet/cultural garden. After almost no response to an invitation to have refreshments in the garden after school, we decided to hold the consultations as part of a two-day programme of celebrations of each particular culture. The first ones we held were 'Nigerian Days', when we invited in parents and cultural groups to give the children experience of artwork, music, cookery, storytelling, etc.. These days were a great success with many parents from all cultures coming, and suggesting many interesting ideas for indigenous Nigerian plants and artifacts.

This experience confirms the findings of the research which indicated that parents from inner-city environments are more likely to become involved in environmental/development (ESD) issues when they originate from issues which are of personal interest/concern to them. Following on from this success, we intend to hold more 'cultural days' with garden consultation sessions and a 'multicultural' day to celebrate the school's 30th birthday later this year, when we shall also take the opportunity to promote ESD issues.

#### **What did I learn from the process?**

I feel that the research has and will be valuable to me, in that:

- it supports my beliefs and provides justification for the teaching of ESD in schools such as ours;
- it has made me more aware of the issues which need to be addressed in order to make the teaching of ESD successful in an inner city environment.

## 2.2 USING RESEARCH IN THE SECONDARY SCHOOL

The two secondary school teachers in this project focused on very similar aspects of the review: studies about students' misunderstandings of global environmental issues. What is interesting, though, is how they responded to these findings in different ways.

For **Lara Dawson (Case Study 4)**, the idea that young people have poor understandings of global environmental issues was something that she 'doubted' and 'wanted to test'. When she explored this with her own students, however, she was surprised by what she found. The fact that 'only 5 students out of the 15 [she tested] could identify specific types of air pollution' has raised a number of difficult questions for her as a teacher. One of the outcomes she describes is 'constantly wondering if students have understood what I am teaching'.

For **Jim Rogers (Case Study 5)**, meanwhile, the research about young people's misunderstandings was something that he agreed with and made him feel that he was 'not alone'. He was therefore not concerned with testing the validity of the reported findings, but rather with finding 'information from the research that might help explain why these misconceptions are happening' and what can be done to reduce them. Through exploring the idea that 'confusion is not simply one of knowledge but also one of conceptualisation', he begins to ask questions of the representations of environmental issues in his teaching.

### **CASE STUDY 4: USING RESEARCH TO INVESTIGATE YEAR 9 STUDENTS' UNDERSTANDING OF ENVIRONMENTAL ISSUES**

*Lara Dawson, Geography Teacher, The Ridings High School, Winterbourne, Bristol*

The Ridings High School is a large, mixed, comprehensive in South Gloucestershire. I have an interest in ESD and believe that ESD is an essential element of the geography curriculum. Before getting involved in this project, I completed a Masters course, which involved carrying out my own research on ESD in secondary schools in south Gloucestershire.

#### **What did I get from reading the research?**

The particular research areas that interested me were the ones related to students' understanding of environmental issues and terminology. More specifically the idea that:

- *'most high school seniors lack the necessary understanding to go beyond the common recognition of an issue and use their knowledge to grasp the consequences of environmental problems or offer solutions for those problems'* (p. 232) e.g. they might know that burning fossil fuel causes pollution, but do not understand the consequences of exploiting fossil fuels.

This point caught my eye when I was first reading the review. I found it interesting and curious, because I doubted the statements made. This made me feel that I wanted to test the validity of the statements with some of my students. I felt that if the research 'held up' in my personal test, then I would be in a position to try to do something to address this issue in my own teaching.

I was also struck by another statement in the research:

- *'The term pollution is particularly unhelpful in educating students about global environmental issues... by conveying too general an impression whereby all pollutants are seen as giving pollution in general ... children need to be made more aware of the specific pollutants.'* (p. 236)

This gave me a feeling of guilt on two counts. First, I could recall past occasions when students might have given me the answer 'pollution', but I had not pressed for a more detailed answer to encourage them to think of specific types of pollution. Second, because I often doubt my own knowledge, I may have skimmed certain issues due to feeling that it is better not to teach something, than to teach it incorrectly.

#### **How did I use this in my practice?**

I decided to create a worksheet to help me find out what the students knew about the two research areas (fossil fuels and pollution) mentioned above. I chose a high ability Year 9 group as I thought they might have a good chance of disproving the research.

I got 15 students to answer 3 questions which I felt were fairly straight forward and 15 to answer 3 questions that I felt were more challenging. The questions were:

Easier:

1. What is a fossil fuel? Can you name any?
2. What are fossil fuels used for?
3. How are fossil fuels used?

More complex:

4. What happens when fossil fuels are burnt?
5. What different types of pollution are caused?
6. Can you identify any specific types of air pollution?

When I examined the responses I found that generally the students understood the basic questions such as 'What is a fossil fuel?' and 'What are they used for?'. Most of the answers were correct but some of the students had gaps in their knowledge or were vague, which left me wondering whether or not they had understood the issue. When asked the more difficult questions, i.e. 'What happens when fossil fuels are burnt?' and 'What different types of pollution are caused?', only 5 students out of the 15 could identify specific types of air pollution, and those that did could only identify a maximum of two examples. Most students simply left this question blank or wrote that they did not know. The result then is that generally the research areas held up to be correct in my very small test.

### **What did I learn from the process?**

As a result of completing this exercise I have found that I now constantly wonder if students have understood what I am teaching. This has led to me:

- questioning students a lot more to test their understanding;
- spending more time circulating around my classes and talking to individuals about their understanding of the work.

Two related concerns are:

- How can I assess changes in students' knowledge and attitude about environmental issues? Finding the time to assess and finding the best/most effective method for assessing is impossible (i.e. this task was far from perfect!).
- When we do teach ESD in geography we use text book and syllabus language and terminology which we expect students to know and understand. For many pupils the words and terms may be difficult to understand and follow e.g. visual pollution, deforestation, and greenhouse effect.

I feel that one of the main lessons to be learnt from this exercise is that students need to be encouraged to think in more depth and breadth, or in most cases students just need to be encouraged to think! I feel the emphasis is still basically on passing tests and exams (factual recall), and there is a desperate need to rejuvenate the enquiry approach to encourage students to think for themselves, especially in subjects like geography.

However, I worry about how long this awareness will last as I find that my motivation for my work comes from having time away from the classroom with other educators - usually in the form of INSET or attending a course. On return to teaching the quality of my work is enhanced and I am motivated about my work but unfortunately it is all too easily forgotten when the mundane tasks kick in again.

**CASE STUDY 5: USING RESEARCH TO INFORM THE TEACHING OF A YEAR 9 GEOGRAPHY CLASS STUDYING ENVIRONMENTAL ISSUES**

*Jim Rogers, Head of Humanities, Ridgeway School, Plymouth (formerly Head of Year, Coombe Dean School, Plymouth)*

I have long been interested in environmental education, and the development of successful and effective practice in this area. I am particularly interested in resolving common problems that I and others experience in teaching environmental education within the secondary school environment. I saw this project as an opportunity to work with other practitioners to access valuable research findings, inform and help develop my own practice and make the experience and the research available to other practitioners.

**What did I get from reading the research?**

Whilst reading through the review I came across the following information:

*'Young people frequently confuse and/or fuse ideas about environmental issues. An often-cited case is poor understanding of the issues of global warming, on the one hand and causes of ozone depletion, on the other' (p.233).*

I agreed with this and was fascinated that I was not alone. After speaking with colleagues in geography and science at my school, I discovered that such confusion and fusion is common at all levels and in all age groups, particularly key stage 3 and 4.

This led me to look further. I wanted to find information that might help explain why these misconceptions were happening, and how I could change my practice to make it more effective. I found a great deal of information, such as:

- *'certain visual and metaphorical representations can be unhelpful to the development of learner understanding...inaccurate ideas may be the consequence of illustrations in school textbooks' (p. 237);*
- *'characteristics of global issues pose difficulties for students' conceptualisation and understanding. Firstly global environmental problems are 'invisible rather than abstract.' (p.240).*

**How did I use this in my practice?**

At the time of reading the research I was teaching a Year 9 group about environmental issues. This involved a series of two lessons on the greenhouse effect and ozone depletion, in which I tried to make it explicitly clear that the two issues were distinct and separate. However a series of questions were raised by knowing the *'confusion or*

*fusion of issues is not simply one of knowledge ... but also one of conceptualisation'* (p. 233):

- In what way could I challenge and develop students' conceptualisation of these issues to reinforce their understanding and distinguish between cause and consequence?
- Would it be as simple as asking students to design diagrams of global warming and the ozone layer to support written answers?
- Should the conceptualisation come from the teacher or from the student?

Knowing that a context in which to ground issues is important to student learning, and being aware that a range of learning styles may demand a variety of methods, the answer was not obvious. However, I plumped for an independent investigation into an environmental issue. The students had four weeks to produce a 'project' with a given structure based on a self-chosen issue. Immediately prior to this the class was asked to comment on what they did (or did not) know about global warming. Six students, all boys of varying academic abilities, responded with reference to the ozone layer.

These students were asked if they would assist me in doing a 'special' project. They were asked to undertake a project on global warming following the standard structure given to everyone else, with the one request that a component of that project had a visual diagram of causes and effects in whatever format they wished.

#### **What did I learn from the process?**

The findings from the review have been hugely important in informing my practice. The process of reflecting on my practice has been very valuable, and from this questions and challenges are still steering my teaching. The research goes beyond justifying a cause for concern and offers evidence that can help look at ways of resolving problems with misconception of global warming, the ozone layer and other environmental issues amongst young people.

Using this knowledge I am more aware when teaching such material. In addition to adopting a range of techniques of presenting the information to meet different learning styles, I can now be far more specific and explicit about teaching global warming and the ozone layer. Key lessons learnt for my teaching are:

- The use of key words - Using the specific names of the layers within the atmosphere in conjunction with a diagram, to help locate the ozone layer and the area most responsible for the greenhouse effect. These key words can be introduced in the preliminary lesson, and then emphasised in the materials and the requirements for students' project work.
- The avoidance of some traditionally-used images - An example is the classic picture of the planet with sun rays as arrows bouncing off the surface of the earth in a

greenhouse, which could be where students' 'fusion' or 'misconceptualisation' first occurs. However, I am still looking for better ways of displaying the images, and have recently experimented with visual props such as balloons, woolly hats and sunscreen.

- Focus on the students' enquiry, not only in presenting written information, but in graphically representing their understanding of concepts - With the Year 9 group, I found that the students who followed the provided project structure most closely, also responded better to the task of focusing on the two issues and drawing distinctions between them. These students also responded better in challenging misconceptions about the two issues, and displayed this not only in their projects but also in conversation. I am sure the active challenge of students generating their own diagrams can be helpful in reinforcing their learning.

I have found the process of connecting research to practice very rewarding. Every teacher strives to be a better teacher, and to be able to link research and their teaching is valuable. The findings from the research have been informative and accessible. It has surprised me how useful it has been. A challenge has been to prioritise the most informative findings, and try not to encompass too much. However the extent of the findings encourages a lot more development and a fresh look at subjects taught in a traditional format.

## 2.3 USING RESEARCH IN OUTDOOR/COMMUNITY SETTINGS

The two practitioners from non-school settings demonstrate further uses of research.

**Julia Sargent (Case Study 6)**, Head of Education at the Northmoor Trust for Countryside Conservation in Oxfordshire, shows how research raised 'powerful questions' about practice for her and her colleagues. One particular concern was the factual correctness of the ideas that they are teaching at the Trust, and Julia decided to investigate this through discussion and observation with her colleagues. This raised implications relating to staff training and mentoring, as well as the potential role of research as a basis for a new Education Strategy for the Trust.

As an environmentalist-in-residence working with Hackney schools, **Prue Poulton (Case Study 7)** uses the research to reflect on the types of ESD work that she has undertaken with local schools. In the research, she found support for several of the practices that she has been using for many years. Through the project, she has been able 'to look at ESD work in different contexts and countries' and find 'quotable evidence to use when approaching new schools'.

### **CASE STUDY 6: USING RESEARCH TO INVESTIGATE THE FACTUAL CORRECTNESS OF ESD TEACHING AT AN OUTDOOR CENTRE**

*Julia Sargent, Head of Education, Northmoor Trust for Countryside Conservation, Little Wittenham, Oxfordshire*

Northmoor Trust for Countryside Conservation is an Oxfordshire-based charitable organisation promoting and inspiring wildlife and countryside conservation. I am responsible for a team of 13 full and part-time enthusiastic and dynamic people with diverse job descriptions and roles. Together, we are engaged in providing environmental education/ESD for the general public, families, farmers, schoolchildren and teachers.

#### **What did I get from reading the research?**

When I read the review there were certain ideas that seemed particularly relevant to our work:

- *'students are active experiencers, rather than passive recipients, of environmental curricula, and respond to learning situations in individual ways'* (p. 302);

- '*students' environmental factual knowledge can vary for different environmental topic areas*' (p. 227) and '*can be influenced by gender, schooling and socio-economic grouping*' (p. 228);
- teaching styles can influence students' learning about environmental issues positively and negatively (p. 236).

These research findings roused emotive and powerful questions for me as a practitioner. In particular:

- Have we realised that students are critical consumers rather than passive recipients?
- Do we assume too much about children's willingness to be out and about in the countryside?
- Are we sure that the information we teach is accurate and relevant?

#### **How did I use this in my practice?**

I decided to focus my efforts on the last of these questions as I thought this would be the easiest to investigate in the time scale of this project. I also felt that investigating this would have a real and immediate impact on what we do and how we do it. In order to explore this further, I undertook two main activities:

##### *(i) Discussion with team members and other colleagues*

Understandably there was mixed reaction within the team. Some were defensive, perhaps thinking that investigating this would mean extra work on an already full timetable. One or two suggested that it didn't really matter if the facts weren't 100% correct, depending on the age of the children. Attitudes and enthusiasm were considered more important. Everyone agreed that there was an excessive emphasis on risk and Health and Safety assessment, and there were too many restrictions on groups in the countryside. Children weren't being given the opportunities to make decisions for themselves nor being given opportunities to demonstrate they can be trusted e.g. 'Wait by the next stile'.

When asked, most people admitted rarely updating their knowledge of site-specific plants and animals, but instead relied on what they already knew. Most members of the team could recall incidences of giving wrong answers and misinformation, such as not correcting the child who said a young deer was called a foal. If children asked questions on site which staff couldn't answer, all of them said they would be honest and say "I don't know, but we can look it up when we get back". Some admitted, however, that they didn't always remember to look up the answers.

A few colleagues said they would use the Internet, but agreed it was time consuming; few would use the well equipped library on site. We all agreed in discussion that it was difficult to be knowledgeable about everything in the field of environmental studies,

but that everyone should understand the basic ecological principles and concepts. It was also agreed it was essential to keep a little bit of magic and make-believe. But finding ways of ensuring children realised which was the make-believe element was sometimes difficult.

*(ii) Observation of team members and other colleagues*

I was able to observe our team leaders introducing sessions in the centre, and a teacher at a local school undertaking follow-up work after visit to the Trust. I recognised how easy it is to pick up mistakes and how difficult it is to put them right, reinforcing the immediate need to identify staff baseline knowledge. It is also relatively easy to identify someone else's strengths and weakness in a very short time, which suggests that a mentoring system may help if we could develop some guidelines.

**What did I learn from the process?**

This work has raised a number of issues which we feel may be of value to share with other environmental educators. These concern:

Our knowledge about learners, and

- ♦ the need for greater awareness and training amongst outdoor educators about the diversity of children's learning styles and how we can adapt activities to meet these;
- ♦ the importance of having high expectations of learners, as children are usually capable of more than is expected of them;
- ♦ questioning the use of sarcasm, irony and wit in our work with children, and recognising the potential for misunderstanding.

Our knowledge about sustainability issues, and

- ♦ the need for factual information to be correct, as enthusiasm is no substitute for factual correctness;
- ♦ the need to access up-to-date and accurate information on ESD, as opposed to information picked up in passing from other contexts.

Our knowledge about ourselves and our practices, especially

- ♦ the need to establish baseline levels of knowledge amongst staff through audit and training;
- ♦ the potential value of developing a monitoring system, possibly with support from an external person such as an LEA advisor or ex-headteacher with experience in the outdoor sector.

As well as this, I am now using the research as informed and realistic evidence on which to base a new Education Strategy for the Northmoor Trust. Some of the findings will be used to validate issues which always appear in long term strategic planning such as repeat visits (how many, how often), which schools are targeted, practical work, and age groups. The findings add credibility to our existing Education Outreach programme and will help with funding applications. Having had the opportunity to take part in the user review will undoubtedly help me produce, together with the other members of the team, a credible, well balanced, long term and dynamic strategy for the Trust.

The research findings are far more valuable than I originally thought they could or would be. After completing this project, I now think the research should be essential reading for all Heads of Centres.

#### **CASE STUDY 7: USING RESEARCH TO REFLECT ON ESD WORK UNDERTAKEN IN AND WITH LOCAL SCHOOLS**

*Prue Poulton, Environmentalist-in-Residence for Hackney schools, London.*

My work involves team teaching in every class in a school over a period of two terms to develop sustainability issues relating to the planned geography and science themes. I also work with the environmental coordinator through INSET sessions to include all staff in producing an environmental policy. The aim of this is to incorporate ESD as an essential part of curriculum planning, and encourage practical environmental improvements.

##### **What did I get from reading the research?**

The section of the research that interested me most was the part concerned with environmental learning outcomes (p. 262 - 274), which considers the effectiveness of a variety of ESD initiatives in bringing about attitude changes for students of different ages and backgrounds. I was most interested in this because I wanted to be able to quote such evidence to support my own way of working when introducing the Environmentalist-in-Residence (EiR) scheme to each new school.

The research includes evaluations of school-based work such as term-long programmes built around specific themes like energy and waste or term-long skill-based initiatives using particular teaching strategies, as well as investigations into the effectiveness of out-of-school fieldwork.

The review outlines evidence that the following ESD teaching approaches are influential:

- role modelling where teachers and other students' share their own interest and commitment to environmental quality (p.269);
- outdoor and hands on experiences (p. 263);
- collaborative group discussions (p. 269).

It also reports evidence for the effectiveness of certain programme characteristics, such as:

- fieldwork of 5 days or more has more lasting impact than programmes of shorter duration (p. 270);
- preparation and follow up to fieldwork facilitates longer term impact and attitude change (p.270).

#### **How did I use this in my practice?**

Hanson's (1993) research showed that term-long initiatives and programmes are more effective than sporadic input. This is an essential feature of my practice as an educator for sustainable development in Hackney primary schools where I am 'in residence' for a period of two terms. This allows enough time to initiate, develop and carry out the teaching of sustainability themes linked to the planned theme for a particular term. In the QCA Science Unit 'Keeping Warm', for example, the suggested insulation work lends itself easily to introduction of environmental knowledge about greenhouse effect linked to practical energy conservation action. My teaching approach combines issue investigation and action training wherever possible, which Ramsey's (1993) work showed to be effective.

Uzzell *et al.*'s (1997) research showed that input from home as well as school by teachers and parents with stronger personal commitment to sustainability is significant in developing environmental awareness. In a recent residency, my school gave environmental work a reasonably high profile, but did not integrate it into the curriculum, and although out-of-school fieldwork was fairly common it was rather *ad hoc*. Their teaching approach encouraged diversity of opinion through discussions in circle time, found by Mason and Santi (1998) to '*build new knowledge based on revision of their personal conceptions and beliefs*' (p.269).

A further element of my residency is to link environmental work to a 'live' issue and carry out school-based initiatives leading to action to improve the environment, found to be successful by Leeming *et al.* (1997). Some examples from one school include:

- transforming a small area into a multi-cultural garden, with the support of the school grounds parent group
- stopping a water leak which had cost the school a small fortune over the previous year, after a Year 5 audit of school water led us to contact Thames Water
- a Year 3 investigation of school energy use resulted in talks with the school keeper, after which a thermostat reset saved £400 in one quarter
- as part of a whole school Safe Routes to School project, all classes investigated the transport issues of the area and forwarded their ideas for improving environmental quality and safety for children, teachers, parents and school visitors to Council Officers and their MP. The excellent work resulting from this was displayed as an exhibition for the participants of the Hackney Agenda 21 Safer Routes to School Conference at the school. We compiled a school travel plan and distributed it to the whole school community to publicise our initiative and ask for support.

### **What did I learn from the process?**

My own practice as EiR shows that individuals within a class vary enormously according to whether there is concern for environment in students' immediate families as well as in the school. The existing research evidence supports my belief that even very young learners are more sophisticated than sometimes thought and issue-based ESD is well within their grasp.

I can also corroborate the evidence that certain approaches to learning are significant in bringing about change. The existing research evidence does not, however, contribute to my personal research interest in how my practice relates to long-term attitudinal change. There is a need for a research study which compares schools where ESD is included in the school curriculum and management practices, with schools which only sporadically cover environmental issues and do not 'practice what they preach'.

Involvement in this project has been really interesting and rewarding, enabling me to look at ESD work in different contexts and countries. It has supported my own belief in my way of working, and given me quotable evidence to use when approaching new schools.

### 3. GUIDANCE ON USING RESEARCH

This section offers some suggestions for practitioners and researchers interested in exploring connections between research and practice.

#### **How can practitioners go about using research?**

We have come to see the process of using research in terms of four steps (Figure 2). This is not a definitive model, but an account of strategies that we found helpful.

#### **Step 1: Identifying questions to ask of the research**

We suggest that the starting point for making links between research and practice has to be practitioners' interests. The key question, therefore, at the outset is:

- *What challenges or issues do I face in my practice, and what aspects of my practice would I like to improve or understand better?*

This, of course, is likely to raise a whole range of concerns, some of which will almost certainly require a lot more than research findings to address, for example shortages of funding, national curriculum requirements, and local political priorities. An important question for practitioners and researchers to explore together is:

- *Which of these challenges and/or aspects of practice might be helped by research, and which are beyond the realm of research?*

This is not an easy question, but in our experience getting clearer about this is a crucial part of the process of being able to make links between practice and research.

**Step 2: Reading the research and identifying points of interest**

Out of Step 1 should come a number of questions/topics to explore in the research. An example from one of the participants in this project was a teacher who wanted to find 'key arguments I can use when giving talks about ESD to other schools'. It is worth pointing out that this initial focus may well not be the one that is eventually pursued; it may simply serve as a starting point for the initial reading.

A key question for practitioners at this stage is:

- *Is there anything in this research that is of relevance to my selected focus or my practice more generally?*

This process of beginning to read research is not easy, but we found that it can be helped in various ways, as suggested by Figure 3.

**Figure 3: Ways of Supporting Practitioners to Engage with Research**

**Step 3: Exploring connections between these points and your own practice**

Having identified points of interest/relevance in the research, the next step is to explore how these might connect to practice. This is 'the magic step'! It is as much about reflecting on the connections already made, as it is about working out what does this now mean for my practice. In other words, some crucial initial questions are:

- *What was it about these particular points that made me see them as interesting /relevant to me?*
- *How did they make me feel/think when I read them?*

The answers to these questions may then help lead into further questions such as:

- *What do these research ideas mean for me and my practice?*
- *How might they provide support, raise challenges, stimulate reflection, promote inquiry and/or initiate changes in my thinking and practice?*

**Step 4: Reflecting on the lessons learnt and the way forward**

It is clear from the case studies that the use of research by practitioners is not a one-off event, but an ongoing process. With this in mind, three issues for consideration are:

- *What have I learnt and how might I share this with my colleagues and students?*
- *How might I continue this process further in the future?*
- *What kinds of intellectual, practical and collegial support would help me to do this?*

**How can researchers help to facilitate this process?**

Researchers have an important role to play as facilitators of research utilisation. We suggest that researchers need to recognise:

- **practitioners' varying starting points** - practitioners will approach research in quite individual ways depending upon their professional interests and contexts, and may well begin with unrealistically high or unhelpfully low expectations;
- **the challenging nature of the process** - reading, making sense of and trying to use academic research is not easy, and researchers can help by providing practitioners with ways into the research, and some sense of why a particular piece of research might be worth reading;

- **the ever-present challenge of language** - sooner or later researchers and practitioners working together will run into difficulties with language, and these need acknowledging and working through on both sides;
- **the diverse ways in which research can be used** - using research can cover a wide range of processes, including supporting, challenging, reflecting on, investigating, changing and/or informing practice;
- **the multi-faceted nature of practice** - practice is not simply about what practitioners do, but also how they think, how they plan, how they feel about what they do, how they talk about what they do and how they reflect on what they do;
- **the importance of 'letting go'** - in facilitating research use, there is a risk of researchers imposing their own understandings of the research; instead they need to make space for practitioners to find their own meanings in the research.

In conclusion, this project highlights the need for researchers to think more strategically about the relationship between the production of research and the use of research. There is a need to move beyond notions of research dissemination towards ideas of building partnerships for research utilisation. Such partnerships need to recognise the subtleties of the collaborative process between researchers and practitioners, and the challenges involved in connecting research and practice. They also need to embrace the development of new skills, languages and ways of working, among researchers and practitioners (see Nutley *et al.*, 2003). Evidence-based or evidence-informed practice will remain abstract ideals until greater opportunities are provided for practitioners to engage with research and researchers as part of their ongoing professional learning.

## 4. CONCLUSIONS

This project provides some important insights into the processes, challenges and potential benefits of seeking to connect research and practice in education.

### Key messages

- At present there are very few opportunities for practitioners to engage with research as part of their ongoing professional learning.
- This project shows that research can be useful to practitioners, in terms of providing support, raising challenges, stimulating reflection, promoting further inquiry, and/or initiating change.
- Reading and using research is neither simple nor straightforward, but can be helped by having a clear focus and purpose, being able to share the process with other practitioners/ researchers, and having time to identify ideas that are meaningful in one's own context.

### Implications

- Researchers have an important role to play in facilitating the use of research, and this demands new skills, languages, and ways of working with research users, and a willingness to think more strategically about the relationship between research production and research utilisation.
- Those interested in enhancing the use and usefulness of research need to appreciate that (i) practitioners will approach research in quite different ways depending on their professional interests, roles and contexts, and (ii) connecting with practice means connecting not only with people's actions but also with their thoughts, ideas and feelings.
- There is a need to move beyond notions of research dissemination towards ideas of building partnerships for research utilisation.

## 5. REFERENCES AND OTHER INFORMATION SOURCES

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### OTHER INFORMATION SOURCES

#### About ESD

- <http://www.nc.uk.net/esd/> - The Qualification and Curriculum Agency's curriculum guidance/support for ESD.
- <http://www.defra.gov.uk/environment/sustainable/educpanel/index.htm> - Reports and advice from the Government's Panel on Education for Sustainable Development.
- <http://www.cee.org.uk/> - The Council for Environmental Education's gateway to environmental education organisations and resources.
- <http://www.dea.org.uk/> - The Development Education Association's gateway to development education organisations and resources.

#### About research

- [http://www.topiconline.co.uk/index\\_1.asp](http://www.topiconline.co.uk/index_1.asp) - The National Foundation for Educational Research's online summaries of research for schools and teachers.
- <http://www.gtce.org.uk/research/romhome.asp> - The General Teaching Council's monthly research page for practitioners entitled 'Research of the Month'.
- <http://www.standards.dfes.gov.uk/research/> - The Department for Education and Skills' new Research Informed Practice site with searchable digests of research.
- <http://www.teachernet.gov.uk/research/> - DfES's information service for educational professionals interested in all aspects of research.
- <http://www.tta.gov.uk/itt/providers/research/panel/index.htm> - The website of the National Teacher Research Panel, an advisory body of expert teacher researchers.
- Practitioner journals such as those of the Geographical Association (<http://www.geography.org.uk/>) and the Association for Science Education (<http://www.ase.org.uk>).
- Academic journals such as *Environmental Education Research* (<http://www.tandf.co.uk/journals/carfax/13504622.html>).