

Readership : primary, secondary

ENVIRONMENTAL EDUCATION: RECENT RESEARCH ON LEARNERS AND LEARNING

Mark Rickinson of the NFER summarises the findings of a review of recent research on students and their learning in school-based environmental education. He concludes with a consideration of possible implications for practitioners and policy makers.

BACKGROUND

The difference between a sustainable or a chaotic future is learning. (Stephen Sterling (1))

The past 30 years have seen growing international recognition that the challenges associated with environmental degradation and sustainable development have important implications for, and connections with, education and schooling. The concept of environmental education is now widespread in national educational policies, curriculum documents, curriculum development initiatives and conservation strategies. In England, for example, one of the requirements of the revised National Curriculum is for schools 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 (2).

It was against this curriculum backdrop that the NFER decided to undertake a review of recent research on students and their learning in school-based environmental education. This article presents a summary of the findings of this review (3), both in terms of characteristics of the current evidence base and key messages about learners and learning. It starts with a brief outline of the review's aims and methods, and ends with a consideration of possible implications for practitioners and policy makers.

AIMS AND METHODS

This project reviewed over 100 empirical studies, published between 1993 and 1999, of learners and/or learning in primary or secondary school environmental education. The purpose was to examine the nature and quality of current research evidence on students and their learning in environmental education.

In its methods, the review sought to be systematic, comprehensive and analytical. The findings are based on careful scrutiny of over 100 journal articles, books and reports, identified using a variety of search methods (i.e. bibliographic databases, manual journal searches and researcher networks).



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THE EVIDENCE BASE

The evidence base on learners and learning in environmental education was found to have the following characteristics:

- ◆ it is considerable in size and seems to be growing through time;
- ◆ it comprises six main concentrations or nodes of evidence, three of which are well established and three of which may be regarded as emergent (see Box 1);
- ◆ it has a predominance of quantitative, rather than qualitative, evidence, but this is changing as new foci (e.g. students' perceptions of nature) emerge, bringing different methodological approaches and conceptual frames;
- ◆ it provides more information about students' *environmental* knowledge and attitudes than about their *educational* experiences and preferences, and more about learning *outcomes* than learning *processes*.

Box 1: Six concentrations of evidence

Established nodes (with considerable research evidence):

- students' environmental knowledge
- students' environmental attitudes and behaviours
- students' environmental learning outcomes.

Emerging nodes (with less research evidence):

- students' perceptions of nature
- students' experiences of learning
- students' influences on adults.

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THE KEY MESSAGES

This section summarises the key messages for each of the six nodes within the evidence base.

Students' environmental knowledge

Surveys of young people in several countries report generally low levels of factual knowledge relating to environmental issues. More detailed investigations of students' ideas about specific environmental phenomena (e.g. the greenhouse effect) find there to be considerable misunderstanding of the science of such issues. Examples include students confusing ideas about phenomena such as the greenhouse effect and ozone depletion, or displaying poor understanding of processes such as melting or recycling.

Across several studies, the main sources of young people's environmental information are found to be television and school. Other sources include the print media, family and friends, environmental experiences and environmental non-governmental organisations (NGOs). There is some evidence to suggest that students' environmental knowledge and information sources can be affected by gender, age, socio-economic grouping, geographical location and schooling.

Students' environmental attitudes and behaviours

Surveys of young people in various countries report generally positive environmental attitudes – i.e. greater agreement with pro- rather than anti-environmental sentiments. However, several studies find students to be less environmentally conscious in relation to certain issues, in particular, those linked to their own lives and material aspirations.

In terms of pro-environmental behaviours, there is evidence that young people have some involvement in practices relating to energy conservation, recycling and (less commonly) 'green consumerism'. Most studies, however, emphasise the need for these behaviours to increase, and to encompass consumption practices and social political actions, as well as conservation practices.

Evidence on influencing factors in relation to young people's environmental attitudes and behaviour includes gender, age, socio-economic grouping, geographical location and schooling. In relation to gender, for example, findings from several studies show girls to be more pro-environmental than boys in their attitudes and behaviours.

Students' environmental learning outcomes

Some educational interventions, including residential field courses and school-based initiatives, can effect change in students' environmental knowledge and/or attitudes and (in a few cases) behaviour. Effects, however, tend to be measured in the short term, and the evidence on their durability over time is not clear.



Little is known about how and why programmes are able to bring about certain kinds of learning outcomes. The small number of studies that have attempted to explore this suggest that:

- ◆ learning outcomes can be facilitated by certain processes such as role modelling and direct experience on outdoor courses, and collaborative group discussion in classroom lessons;
- ◆ programme duration, location and preparation/ follow-up work can affect outcomes;
- ◆ different kinds of programmes can affect learners' environmental knowledge, attitudes and behaviour in different ways; and
- ◆ different kinds of students (e.g. those with more or less environmental interest) can be affected differently by environmental learning experiences.

Students' perceptions of nature

Studies in Australia, the UK and USA suggest that young people perceive 'nature' as natural living things with minimal or no human interference, and as a relatively static entity. Three recurring themes expressed by young people are of nature as a place for leisure and solitude, as potentially dangerous and frightening, and as being under threat.

While at a preliminary stage, there are findings which suggest that students' perceptions and constructions of nature may be shaped by influences such as their socio-economic setting, experiences of nature and exposure to images and ideas within the media.

Students' experiences of learning

A small number of studies suggest that students have mixed views of their environmental education at school. While environmental education undertaken with certain teachers or as part of particular action-oriented programmes is praised, there is criticism voiced in relation to environmental teaching being concentrated in particular subjects or lacking practicality and relevance.

More detailed investigations of students in particular environmental learning situations suggest that learners can be highly individual in their responses to such experiences. The emerging picture is of students as critical consumers, rather than passive recipients, of environmental curricula.

Students' influences on adults

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. In other words, environmental education programmes can have an impact not only on students, but also indirectly on parents.

Such influence, however, is not an automatic process, and appears to be facilitated by programmes being enjoyable for students, including tasks that 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.

IMPLICATIONS FOR PRACTITIONERS AND POLICY MAKERS

Perhaps the most important outcome of this review is its demonstration of the considerable amount of research activity that is currently occurring in the area of learners and learning in environmental education. The review highlights a number of topics relating to school students for which research evidence is currently available. In considering possible implications, however, it should be recognised that research evidence will rarely translate easily into simple ingredients for developing environmental education practice or policy. Having said that, I would argue that the empirical findings contained within this review could be useful to research users in terms of:

1. suggesting helpful and unhelpful aspects of environmental education from the perspective of learners and/or learning outcomes; and
2. highlighting characteristics of learners that could have implications for practice and policy in environmental education.

1. Helpful and unhelpful aspects of environmental education

The research discussed in the review may help to suggest certain aspects of environmental education that are either helpful or unhelpful from the perspective of learners and/or learning outcomes. The research on students' ideas about global environmental issues, for example, identifies a number of aspects of environmental teaching that may be a hindrance to students' understanding of such issues. These include:

- ◆ use of general terms such as ‘pollution’ which, it is argued, can hinder students distinguishing between different pollutants and environmental problems;
- ◆ abstract nouns such as ‘habitat loss’ in textbooks which, due to their abstract and agentless nature, are found to have less salience for students and so can be easily overlooked;
- ◆ schematic diagrams illustrating the greenhouse effect using arrows approaching the earth which, it is argued, can be misread by students as showing the greenhouse effect being caused by holes in the ozone layer allowing more solar radiation into the earth’s atmosphere;
- ◆ studying environmentally responsible behaviours, such as recycling, without considering exactly how and why such practices are environmentally beneficial as this can result in ‘blurred knowledge’ among primary school children; and
- ◆ learning about scientific explanations for environmental phenomena, such as the timing of spring, which reportedly can lead students to give up more common-sense explanations that may, in fact, be more helpful to them in their daily lives.

In highlighting these arguments, however, I would add that they each make assumptions about the nature of environmental teaching, which may or may not be shared by individual research users coming to consider their possible implications.

The research on learning outcomes, meanwhile, proposes that certain aspects of environmental education programmes can be helpful in terms of effecting positive changes in students’ environmental knowledge, attitudes or behaviours. These include:

- ◆ outdoor residential field courses lasting for a week rather than one or two days;
- ◆ out-of-school visits to local zoos and public gardens encompassing preparatory and follow-up work;
- ◆ school-based programmes including elements of community and parental involvement;
- ◆ environmental curricula focusing on actual local environmental issues as opposed to envisaged or construed ones; and
- ◆ processes such as role modelling and direct experience in outdoor courses, and collaborative group discussion in classroom lessons.

All of these characteristics, however, need to be considered in relation to the nature, aims and context of the particular programmes that were evaluated. That is, they are not necessarily generalisable ingredients for success for any programme of environmental education, but characteristics that yielded differences for *particular* programmes.

2. Characteristics of learners

A second way in which the research evidence may be useful for research users is by providing information about characteristics of learners that could have implications for practice and policy in environmental education. A general point that emerges from this review is that students come to environmental education with a whole host of existing environmental and educational perspectives. The ways in which these play out in relation to particular environmental learning situations would seem an important issue for practitioners and curriculum developers in environmental education. In terms of specifics, consideration might be given to the fact that:

- ◆ young people, including those of primary school age, are capable of sophisticated thinking in relation to environmental issues;
- ◆ individual students, including boys and girls and older and younger students, may differ considerably in their attitudes towards, concerns about and perceptions of the environment and nature (several studies, for example, suggest that girls are more aware of immediate, local problems relating to human health, while boys focus more on longer-term and more abstract issues);
- ◆ students can differ in their curricular and pedagogical preferences, and thus may respond to different kinds of environmental education activities in varying and individual ways; and
- ◆ certain aspects of global environmental issues, such as their processes, distinctions and interconnections, appear difficult for students to understand, and can become the source of considerable confusion and misperceptions.

The issue emerging from all of the above statements is how these characteristics of learners might be taken into account in teaching and learning practices within environmental education. This is particularly important when one considers that all of the above characteristics may differ in significant ways between students and their teachers. As Payne (1998) asserts:

Environmental educators would do well to consider learners’ views about ‘nature’ and the ‘environment’ [...] Without an adequate understanding [of such views] teachers may find themselves promoting a view, or experience of nature that has a lot, little or nothing to do with children’s daily living circumstances (4).

POSTSCRIPT: THE NEED FOR COLLABORATIVE RESEARCH REVIEWS IN ENVIRONMENTAL EDUCATION

A key point that emerges from this project is that the practical implications of the above research evidence will only become clear through greater dialogue between researchers and research users. In other words, there is a need for what Bassey calls 'user reviews'. Bassey draws a distinction between an *academic* review: 'a critical and analytical account of the state of public knowledge of the topic', aimed primarily at other researchers, and a *user* review: 'a form of professional paper which is devised and written by researchers and users working together', with the aim of critically informing the thinking of a particular policy-maker or practitioner audience (5).

Drawing on Bassey's ideas, plans are in progress to use this review as the basis for a collaborative project involving a small group of teachers and researchers. This project, entitled 'Education for Sustainable Development – Making Research Count', will develop an innovative document and website for teachers on the implications emerging from the review for the teaching of education for sustainable development within schools.



Learning through Landscapes

References

- 1 STERLING, S. (2001). *Sustainable Education: Revisioning Learning and Change*. Dartington: Green Books, p. 10.
- 2 QUALIFICATIONS AND CURRICULUM AUTHORITY (1999). *The National Curriculum: Handbook for Secondary Teachers in England. Key Stages 3 and 4*. London: QCA, p. 11.
- 3 The complete version of the review is published as: RICKINSON, M. (2001). 'Learners and learning in environmental education: a critical review of the evidence', *Environmental Education Research*, 7, 3, 207–320.
- 4 PAYNE, P. (1998). 'Children's conceptions of nature', *Australian Journal of Environmental Education*, 14, 19–26.
- 5 BASSEY, M. (2000). 'Reviews of educational research', *Research Intelligence*, 71, 22–9.

The author is keen to hear from any practitioners who might be interested to know more about this project during the academic year 2001/02.

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