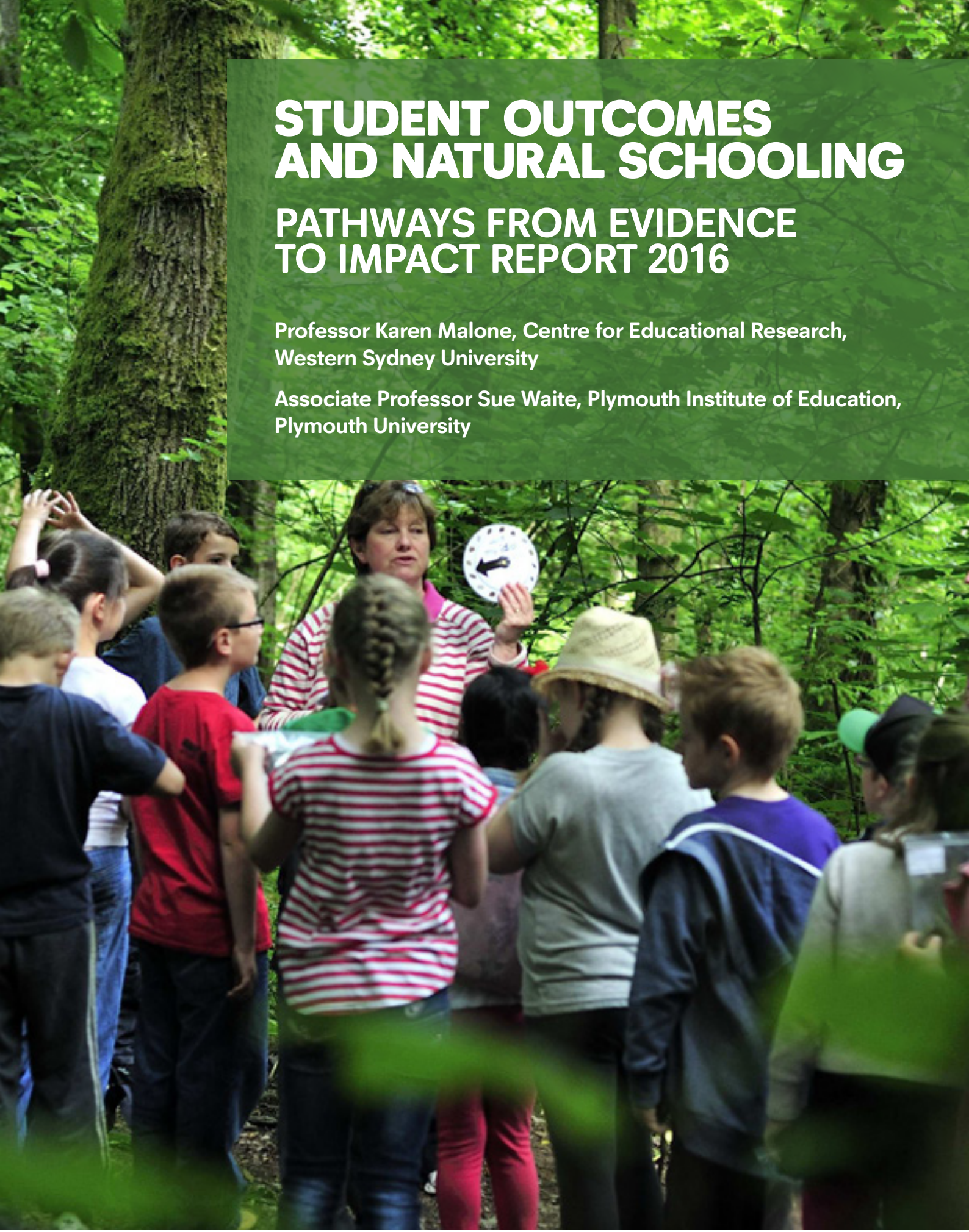

STUDENT OUTCOMES AND NATURAL SCHOOLING

PATHWAYS FROM EVIDENCE TO IMPACT REPORT 2016

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ACKNOWLEDGEMENTS

We would like to thank all the contributors to the conference, the presenters, attendees, steering group and organisers, for making the conference a successful meeting of minds across countries and sectors and providing the foundations for this pathways from evidence to impact report. We would also like to express our gratitude to Plymouth University, University of East London, ESRC and Natural England for contributing funding for the report and conference.

Please cite this report as:

Malone, K. and Waite, S. (2016) *Student Outcomes and Natural Schooling.* Plymouth: Plymouth University. Available online: http://www.plymouth.ac.uk/research/oelres-net

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PATHWAYS FROM EVIDENCE TO IMPACT REPORT 2016

EXECUTIVE SUMMARY

'Children are becoming disconnected from the natural environment. They are spending less and less time outdoors. In fact, the likelihood of children visiting any green space at all has halved in a generation.'

Natural Environment White Paper (HMG 2011:12)

'Experience and a variety of evidence suggest that learning in natural environments (LINE) can be effective in delivering transformational change in outcomes for students and hence by inference to school performance.' (eftec 2011:1)

Over the past ten years there have been five significant reviews conducted around the focus of children learning in natural environments in the UK and further abroad (Rickinson et al. 2004; Malone 2008; Gill 2011; Dillon & Dickie 2012; Fiennes et al. 2015). All these reviews identified significant evidence that outdoor learning can, and has made, a significant impact on improving children's quality of life. These reviews coincide with a time when there is evidence that childhoods are dramatically changing, and children are experiencing limited opportunities to be outdoors in formal or informal learning settings, with consequent negative effects. The evidence especially reveals that lack of exposure to natural environments denies children the opportunity to develop understandings and experiences that will have a long term impact on the quality of their lives, particularly in relation to their physical health and wellbeing and 'character capabilities' such as application, self-regulation, empathy, creativity, and innovation, and their capacity to be successful learners and active contributing members for a sustainable society. This report responds to an urgency to address this social predicament; the childhood disconnect from nature and importance of learning in natural environments, with a view of encouraging policy makers to recognise the value of outdoor learning and the opportunities that it provides to overcome these contemporary challenges to children's education, health, wellbeing and future success in life.

A conference on this topic was convened by a consortium of partners led by Plymouth University's outdoor and experiential learning research network in July 2015, with the aim of sharing learning and best practice from national and international experts working as practitioners, researchers or policy makers on learning in natural environments.

This report signposts pathways from evidence to impact in learning in natural environments by:

1. summarising the **research context** including evidence on the influence that social and economic factors have on the scale and nature of children's use of and access to the natural environment and the challenges this presents, and reviews of the impact of outdoor learning - in particular on the foundational dispositions and non-cognitive skills that are associated with children's attainment, and their health and wellbeing;
2. summarising the **policy context** including the latest policy priorities that outdoor learning can address;
3. presenting the **practice context** through evidence from 21 national and international school-based outdoor learning case studies reported from eleven countries - highlighting challenges and opportunities, and making recommendations for improving delivery and evaluation of programmes to better support policy and practice; and
4. proposing **pathways to impact** for policy transformation, and highlighting how developing more productive exchange between policy and research in outdoor learning might support these pathways by highlighting critical gaps in evidence and recommending ways to address these gaps.

In response to the studies reported at the conference, substantial literature review and a survey of the policy context for outdoor learning within England, we have proposed a *Framework for 21st Century Student Outcomes* (p.19) that could be attained through sustained learning in natural environments. We have termed this embedded practice of progressive forms of outdoor learning 'Natural Schooling' in this report. The student outcomes included in the Framework are grouped under five themes: *A healthy and happy body and mind; A sociable, confident person; A self-directed and creative learner; An effective contributor and An active global citizen.* For each outcome, relevant theory, research and practice are aligned to show how each could be achieved. Recognising the crucial role of policy makers in achieving these aims, the report then addresses some challenges particularly relating to the research/policy interface, research gaps and how research can better respond to a variety of policy needs. A model is presented that focuses on the research needs of policy makers at different stages in the process of developing public policy (p.27).

In concluding, the report offers a series of recommendations (p.34) to help improve the impact of policy and research underpinning the implementation of the Framework for 21st Century Student Outcomes from outdoor learning summarised here:

- The framework proposed in this report should be discussed in policy and research groups to refine its parameters and relevance. The **consultative process** should be facilitated by an existing network or organisation that can access the full range of interested communities, using the questions raised in the report.
- The resultant **framework** should form the foundation to collate on-going research and review research priorities, and enable better alignment between research and policy. A **database** of policy and research papers should also be developed and maintained by a funded group.
- Development of a practitioner **toolkit** of common research tools and guidance that would enable practitioners undertaking small scale research to aggregate their findings across contexts to capitalise on the valuable qualitative insights from these forms of research should be considered.
- **Funding for longitudinal studies and Randomised Controlled Trials** should be set aside to provide robust comparative datasets for different forms of outdoor learning, including the influence of cultural contexts, yielding the quantitative evidence that is so often required by policy makers to initiate and inform policy change.

INTRODUCTION

Evidence of benefits of children's experience in natural environments including health through increased physical activity; wellbeing through enhancing social and intrapersonal qualities and educational attainment through developing 'characters' of resilience and confidence as precursors to successful learning is available in this report and from multiple reviews. Nevertheless access to these benefits is not equitable especially for those from areas of high deprivation. A key ambition for the government's White Paper (2011) was for 'every child in England to have the opportunity to experience and learn about the natural environment', and it was considered that the marked social inequalities of access could best be addressed by working with schools.

Research in the field of outdoor learning has often been fragmented and relatively small scale, leading to significant challenges for both strategic research and policy development in relation to supporting outdoor learning that would potentially contribute to educational attainment and the health and wellbeing of children and young people. Recent larger scale and more coherent initiatives both in England and elsewhere are now offering the opportunity to engage with national and international evidence that can be effective for research practice informing policy and policy informing research practice. The aim of this report is to draw on this opportunity to propose means for policy makers to access benefits from outdoor learning for society and for the research community to address gaps in evidence to support that aspiration.

A consortium of partners , led by Plymouth University's outdoor and experiential learning research network, convened a conference *Lessons from Near and Far* on 3rd July 2015 to bring together key players from the research and policy communities:

- to provide a forum for learning from international research and policy
- to identify, align with and inform policy directions to capitalise on this powerful resource for children's resilience in their health, wellbeing and learning, in particular establishing Learning in the Natural Environments' (LINE) and outdoor learning potential to develop malleable character traits, such as resilience and perseverance that are precursors to academic attainment.
- to build a shared research agenda that will tackle the key challenges for policy development both nationally and internationally.

This report arises from the conference and is intended to support and signpost pathways to impact by:

- Summarising the **research context** including evidence on the influence that social and economic factors have on the scale and nature of children's use of and access to the natural environment and the challenges this presents and reviews of the impact of outdoor learning - in particular on the foundational dispositions and non-cognitive skills that are associated with children's attainment, and their health and wellbeing
- Summarising the **policy context** including current policy priorities that outdoor learning can address
- Presenting the **practice context** through evidence from 21 national and international school-based outdoor learning case studies reported from eleven countries - highlighting challenges and opportunities, and making recommendations for improving delivery and evaluation of programmes to better support policy and practice
- Proposing **pathways to impact** for policy transformation, and highlighting how developing more productive exchange between policy and research in outdoor learning might support these pathways by highlighting critical gaps in evidence and recommending ways to address these gaps.

The framework proposed was developed through this conference and our analysis of the papers and wider review of policy drivers and research evidence. It focuses on the pathways between policy objectives and forms of outdoor learning, demonstrating the scope for multiple positive impacts through investment in learning in natural environments and providing nuanced guidance about place and teaching and learning theory and practices most suited to particular outcomes. The report also highlights areas for research activity to support strategic understanding of how and to what extent outdoor learning can achieve these desired goals.

University of East London, Natural England, the UK based Strategic Research Group for Learning in Natural Environments (chaired by Natural England), and the Council for Learning Outside the Classroom. ESRC International Partnership funding and input from partners in that award: *Understanding educational and wellbeing implications of learning outside the classroom through cross-national collaboration [ES/J019445/1]*, UEL's in-kind contributions, such as the venue, Plymouth University International Development Fund and Natural England's part-funding towards the report consultancy contributed to this conference.

THE RESEARCH EVIDENCE CONTEXT

BACKGROUND TO KEY THEMES

There have been significant changes in contemporary childhood which are having a profound impact on children's lives. It has been argued a move away from children being active in the outdoors is the product of overburdened educators with a full curriculum, working or busy parents and an increasing culture of risk and fear throughout society (Cutter-Mackenzie et al, 2014, Malone 2007, Freeman & Tranter 2011, Gill 2007). As children lose the freedom to play, explore and be active in their environment, they also lose opportunities that are significant in developing healthy lifestyles, social networks and environmental learning and resilience (Valentine 1997; Kearns et al. 2003; McMillan 2005; Prezza et al. 2005). This trend to keep children indoors occurs despite research indicating that by teachers and parents discouraging children to engage in learning activities outdoors, they are denying them the opportunity to develop understandings and experiences that will have a long term positive impact on the quality of their lives, particularly in relation to their health and wellbeing (Gill 2007, Malone 2007) and 'character capabilities' such as application, self-regulation and empathy (Birdwell, Scott and Koninckx 2015: 31) that underpin successful learners and contributing members of society.

"Green environments are an essential component of a healthy human habitat" according to Frances Ming Kuo (2010), a researcher documenting positive links between nature and human health, social and psychological functioning. Kuo summarizes various research studies that show that humans benefit from exposure to green environments (gardens, parks, forests, etc.) and conversely, that people with less access to green places report more medical symptoms and poorer health overall. Kuo uses the phrase "Vitamin G" (G for "green") to capture nature's role as a necessary ingredient for a healthy life. Evidence suggests that, like a vitamin, contact with nature and green environments is needed in frequent, regular doses (Kuo and Miller 2006; Kuo 2010, Allen & Balfour 2014).

Ofsted (2008) found the engagement in lessons conducted outside the classroom enhanced children's understanding of curriculum subjects, supported children's personal, social and emotional development and could address underachievement. A recent study reported by the Educational Endowment Foundation also found an outdoor adventure programme to have a moderate impact for moderate cost on social and emotional skills and academic achievement (EEFa, 2015).

The arguments supporting the importance of learning in natural environments for children's health and wellbeing development and to enhance their educational achievement are built on the assumption that we *know* that children learning in natural environments is essential for developing the whole child and should be valued. But what do we really *know?* Is there systematic evidence to support the intuitive views that often pervade our understanding of the value of learning in natural environments compared to learning in indoors or in constructed unnatural environments? In this brief background literature review, recent key reviews, reports and evaluations of the field relevant to learning in natural environments have been identified with key findings discussed.

HEALTH BENEFITS

Medical experts, for example, continue to describe increased levels of obesity as epidemic (Waters & Baur 2003; Stubbs & Lee 2004), with lack of exercise, obesity and sedentary lifestyles being linked to Type II diabetes, other "lifestyle" diseases (Lewis & Ker 2005) and also to lower academic attainment (Chalkley et al. 2015). Research has reported that contemporary children are likely to be at higher risk of developing myopia (short-sightedness) due to reduced outdoor play activities, their lack of exposure to outside light and increased screen time (Ramamurthy at al 2015; Rose et. al 2008, Philip, et. al. 2014). Researchers have established that children's health and wellbeing are linked to children's relationship with being outdoors and being active through play and leisure (Bragg, Wood, Barton & Pretty 2013; Cutter-Mackenzie et al, 2014; Davis, Rea & Waite 2006). Beyond the health implications of sedentary lifestyles there have been many claims made in literature about the importance of children spending time outdoors (Gill 2011), including the implication of physical activity in supporting children's attainment (Booth et al. 2014). Contact with the natural world can significantly reduce symptoms of attention deficit disorder in children as young as five years old (Kuo & Taylor 2004). Green plants and vistas reduce anxiety levels among highly stressed children and locations with a greater number of plants, greener views, and access to natural play areas showing significant reduction in children's levels of anxiety (Wells and Evans 2003). Being outdoors can also improve children's nutrition. Children who grow their own food are more likely to eat fruits and vegetables (Bell & Dyment 2008) and to show higher levels of knowledge about nutrition (Koch, Waliczek & Zajicek 2006). They are also more likely to continue healthy eating habits throughout their lives (Morris & Zidenberg-Cherr 2002). Research studies have revealed that access to green spaces, and even a view of green settings, enhances peace, self-control and self-discipline within inner city youth, and particularly in girls (Faber-Taylor, Kuo & Sullivan 2002). They are more likely to feel confident and connected to others rather than anxious and depressed. These factors can improve a child's resilience (Kuo 2010).

LEARNING BENEFITS

Proximity to, views of, and daily exposure to natural settings increases children's ability to focus and enhances cognitive abilities (Wells 2000) supporting self-directed learning and has the capacity to improve academic performance. Studies in the US show that schools that use outdoor classrooms and other forms of nature-based experiential education support significant student gains in social studies, science, language arts, and maths. Students in outdoor science programs improved their science testing scores by 27% (American Institutes for Research 2005). Studies of children in schoolyards/playgrounds found that children engage in more creative forms of play in the green areas. They also played more cooperatively (Dyment & Bell 2008). Play in nature is especially important for developing capacities for creativity, problem-solving, and intellectual development (Kellert 2005). According to the studies by Kellert (2005), nature is important to children's development intellectually, emotionally, socially, spiritually and physically.

SOCIAL AND EMOTIONAL SKILLS

Studies have also identified that children who experience natural spaces (including school-grounds during formal learning or in play) with diverse natural settings are more physically active, more aware of nutrition, more civil to one another and more creative (Dyment & Bell 2008). These children according to studies will be more adaptable, better able to get along with others, healthier and happier when they have regular opportunities for free and unstructured play in the out-of-doors (Burdette & Whitaker 2005; Waite & Davis 2007; Waite, Rogers & Evans 2013) developing non-cognitive skills that underpin successful team working, perseverance and management of stress (Birdwell et al. 2015). Social and emotional skills at age 10 also predict mental health and satisfaction in later life more reliably than cognitive skills (Goodman et al 2015). Moreover, reinforcing their importance, a correlation has also been found between these attributes and educational attainment (Durlak et al 2011; Heckman & Kautz 2013; Barker et al 2014). Heckman and Kautz (2013) amongst others refer to the Big Five character attributes (OCEAN): openness to experience, conscientiousness, extraversion, agreeableness and neuroticism (emotional stability). While some may be more stable personality dimensions, others encompass more malleable competencies: self-perception, social skills, motivation, perseverance, resilience, creativity and metacognition that can be modified by appropriate learning opportunities (Gutman & Schoon 2013).

SENSE OF PLACE AND PRO-ENVIRONMENTAL BEHAVIOUR

Finally, children who spend time outdoors are more likely to be aware of their place in the ecology of the world. If they are able to appreciate how they play an important role in acknowledging and valuing the environment, its effect on their own health and well-being and also on other human and non-human entities as an integrated living system; then they are more likely to be active citizens and environmental stewards in their present and future lives (Chawla & Cushing 2007; Malone 2013). Overall, evidence around the world continues to build that children's engagement with natural environments improves their health and ecological literacy and sustainability learning, and yet these opportunities are being reduced dramatically. As children's lives become less active and school programs channel children from outdoor play environments and into buildings (Malone & Somerville 2015).

EVIDENCE-BASED REVIEWS

Over the past ten years there have been five significant reviews conducted around the focus of children learning in natural environments in the UK (Rickinson et al. 2004; Malone 2008; Gill 2011; Dillon & Dickie 2012; Fiennes et al. 2015). In 2004 Mark Rickinson and colleagues published *A Review on Research on Outdoor Learning* which reviewed a range of published research on outdoor learning for the period of 1993-2003, covering three key educational phases: primary schools, secondary schools and undergraduate programmes of Higher Education Institutions and examined different types of outdoor learning and outcomes. From this large body of research they noted what they believed to be encouraging signs relating to the amount and range of research available:

- a diversification of research into outdoor adventure education, and fieldwork/visits, with greater attention being given to questions of learning processes, learning styles and individual learners
- increased empirical enquiry into learning through fieldwork in higher education, often involving action research and theoretical development
- the emergence of school grounds research as a new dimension to the evidence on outdoor learning, with strong links to the value of outdoor play
- more sustained theoretical exploration of the history and philosophy of outdoor education, and more critical attention to issues of inclusion and access in outdoor learning
- a growing number of meta-analyses and reviews of research, with clear attempts to provide accessible summaries for practitioners involved in different types of outdoor learning work in school grounds, field study centres and outdoor adventure activity centres. (Rickinson et al. 2004: 83)

Rickinson et al (2004) argued that the research provided significant evidence that various forms of outdoor learning could benefit all learners of all ages, and that policy makers needed to be more aware of these benefits. However, although there has been a long tradition of outdoor learning being valued in the UK, there was growing evidence to show

that it was on a slow decline due to other curriculum pressures on learners' time in formal and informal educational settings (Waite 2010). Looking to the future in 2004, they identified a need to consider where the gaps were in the research and seek to create deeper and stronger research evidence. Firstly, by considering how to improve the research rigour, "There was a range of methodological weaknesses evident within certain parts of the literature in this review, including: poor conceptualisation and research design; broad generalisations being made from small samples; too much description without any critical analysis; and little or no follow-up in the medium to long term" (2004: 84). Secondly, they believed there was a need to continue to "improve and deepen the research-based understandings of the outdoor learning process" (2004: 84), especially to consider why and how certain programmes were successful through more comprehensive descriptions of programs.

The report *Every Experience Matters: An evidence based research report on the role of learning outside the classroom for children's whole development from birth to eighteen years* written by Karen Malone in 2008 was commissioned by Farming and Countryside Education (FACE) to support the UK Department of Children, School and Families Learning Outside the Classroom (LOTC) Manifesto. Over 100 studies were reviewed with over half of these being the focus of further documentation and analysis. The *Every Experience Matters* report drew on research from around the globe and provided evidence that children engaged in LOTC achieved higher scores in class tests, have greater levels of physical fitness and motor skill development, increased confidence and self-esteem, show leadership qualities, and were more socially competent and environmentally responsible. The review confirmed that, when children experience the world through explorative play and experiential learning activities in school grounds, wilderness camps, art galleries, parks, or community settings their lives could be positively changed. All these experiences lay the foundation for shaping a child's growing knowledge, confidence and identity. The findings of the review supported a general hypothesis that learning outside the classroom had a significant impact on children's learning and is supportive of healthy child development in the cognitive domain (children's learning), physical domain (children's physical experiences), social domain (children's social interaction) emotional domain (children's emotional well-being) and personal domain (children's responses).

In 2011 Tim Gill, conducted a review of the empirical evidence related to children and nature. In his report *Children and Nature: A Quasi-systematic review of the Empirical Evidence* he documents an extensive review of 61 evidence-based studies that explored in some detail the positive benefits of natural environments for children. He concluded there was significant research evidence to support six claims:

- Spending time in natural environments as a child is associated with adult pro-environment attitudes and feelings of being connected with the natural world, and is also associated with a stronger sense of place.
- Living near to green spaces is associated with greater physical activity.
- Spending time in nearby nature leads to improvements in mental health and emotional regulation, both for specific groups of children (such as those with ADHD) and for children as a whole.
- Children who take part in school gardening projects improve in scientific learning more than those who do not, and have healthier eating habits.
- Experience of green environments is associated with greater environmental knowledge.
- Play in natural environments leads to improvements in motor fitness for pre-school children.

(Gill 2011: 8)

Overall Gill (2011:8) stated: "Taken as a whole, the studies confirm that spending time in nature is part of a 'balanced diet' of childhood experiences that promote children's healthy development, well-being and positive environmental attitudes and values". Gill's review also provided some indication that specific types of outdoor experiences are associated with different outcomes.

These first three reviews considered evidence from informal and formal contexts for learning, but a later review by Dillon and Dickie (2012) concluded that the diverse benefits of learning in natural environments (LINE) created a compelling case for increasing its use in schools, estimating the value of environmental knowledge alone was in the region of £2.1 billion. The eftec (2011) report that contributed to this review set out benefits of LINE and ways to measure impact but pointed out these measures required longitudinal data to corroborate effects. This signals a major gap in the evidence base as insufficient investment in research studies has been made to gather data over a sustained period and monitor changes in the longer term. Existing evidence was found to be in a form that was not readily accepted by policy makers. The diverse benefits identified in this review map well to the outcomes in our framework for 21st Century student outcomes through outdoor learning, including increasing knowledge and understanding, developing skills, changing attitudes and behaviours, health and wellbeing, self-efficacy and self-worth. These outcomes not only have intrinsic positive value for individuals and society but also offer significant reduction of economic costs through averting many negative consequences of not addressing these needs.

'The costs to society of the problems that are encountered in the absence of health, community cohesion, higher educational attainment and so on range from tens of millions to billions of pounds. Even if LINE has only a very small impact on these costs (e.g. reducing the relevant impacts by 0.1%), its value in reducing costs would be very large – of the order of £10m to £20m per year. Greater percentage reductions in impacts would give proportionately greater reductions of costs' (eftec 2011:3).

Finally, a recent systematic review conducted by University College London Institute of Education for the Institute of Outdoor Learning (Fiennes et al. 2015) reviewed published and unpublished literature, and concluded:

- a UK survey would be helpful to establish the scale and scope of outdoor learning activity;
- there was a need for the ongoing collation of diverse scattered studies;
- additional support around ethical practices for practitioner-led research was required;
- greater specification of interventions, contexts and outcomes would marshal and use evidence more effectively.

The most commonly studied forms of outdoor learning appeared to be adventure and residential activity with participants from 11 years upwards and investigating soft skill or 'character' outcomes, with very few studies included that addressed interventions related to curricular or employability outcomes. Nevertheless, they concluded that almost all outdoor learning had a positive effect, and although this effect may lessen over time, it was more sustained with longer term interventions. They recommended that all future studies should more clearly define the intervention, the theory of change being tested, and the methods and outcomes to enable better aggregation of evidence. Their view was that most existing evaluations present weaker evidence as they do not include comparison or control groups or sufficient contextual information to enable the intervention to be transferred to other contexts. They also urged that research topics are identified and prioritised strategically. These recommendations are highly pertinent to this report.

THE POLICY CONTEXT (WHAT OUTCOMES ARE REQUIRED?)

HOW DO KEY RESEARCH THEMES INFORM POLICY AND VICE VERSA?

The Framework developed by the Singapore Ministry of Education **(Fig. 1)** for outdoor learning is a useful starting point to think about structuring the evidence presented in this report around student competencies and desired outcomes, particularly as the focus on student outcomes is not simply about academic achievements but is driven by an acknowledgement that young people need to have other skills to succeed in an increasingly globalised economy.

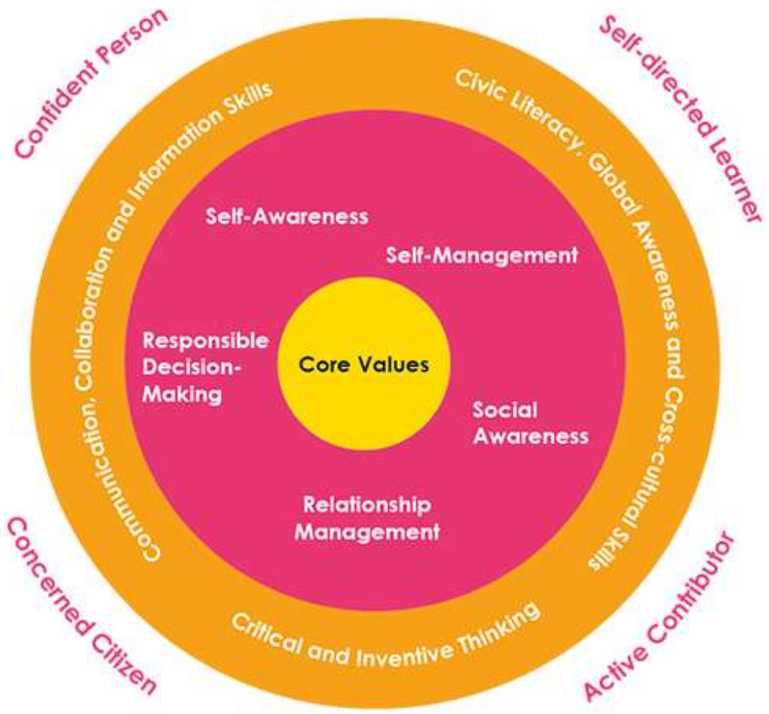


Figure 1: Framework for 21st Century Competencies and Student Desired Outcomes – Singapore Ministry of Education (Copyright ©2014 Ministry of Education, Singapore. All rights reserved)

The rationale supporting the Singapore model is "To better position our students to take advantage of opportunities in a globalised world, our students need to possess life-ready competencies like creativity, innovation, cross-cultural understanding and resilience. The outer ring of the framework represents the 21st century skills necessary for the globalised world we live in. These are: Civic literacy, global awareness and cross-cultural skills; Critical and inventive thinking; and Information and communication skills". Additional to these skills are core values of: Respect; Responsibility; Integrity; Care; Resilience and Harmony.

In identifying the key themes for this Pathways from Evidence to Impact report, the authors have been mindful of the rationale behind the successful Singaporean model of outdoor learning; the evidence already substantiated in previous national and international research reports and evidence based reviews of the field; and the importance of considering the uniqueness of the UK policy landscape. The authors have as the starting point a recognition of the important role children engaging in learning in natural environments could have to contributing to societal outcomes that will improve young people's capacity to be successful and productive contributors now and in their future lives. Although there is considerable debate about the importance of learning qualities other than IQ as a means for describing educational attainment and success throughout the life course (Duckworth & Yeager 2015), there is equally widespread agreement that these non-cognitive (Easton 2013), soft skills (Heckman & Kautz 2012), and 'positive personal qualities other than cognitive ability that lead to student success' (Duckworth & Yeager 2015: 239) *are* beneficial for learners and society. Recently, the term '21st century skills' has been adopted. While these characteristics have long been accepted as implicated in children's education and development, after decades of performative emphasis on standards in educational attainment, there has been widespread recognition that concentration on subject content alone may stifle the creative, enterprising and innovative thinking that is needed to address 21st century challenges.

The skills have been described as:

(a) conceptually independent from cognitive ability;
(b) generally accepted as beneficial to the student and to others in society;
(c) relatively rank-order stable over time in the absence of exogenous forces
(d) potentially responsive to intervention and
(e) dependent on situational factors for their expression.
(Duckworth& Yeager 2015: 239).

Our themes for desired outcomes in health, social capital and aspiration for young people are identified within the policy context of character qualities that society would seek to imbue in young people so they are future ready as successful, healthy and confident contributors in the 21st century and have been demonstrated in recent reviews as achievable through learning outside the classroom in natural environments.

The key themes and outcomes emergent from our analysis are:

- Encouraging healthy bodies and positive lifestyles with a desired student outcome of a *healthy and happy body and mind;*
- Developing social, confident and connected people with a desired student outcome: *a sociable confident person;*
- Stimulating self-regulated and creative learning with a desired student outcome: *a self-directed creative learner;*
- Supporting effective contributions and collaboration with a desired student outcome: *an effective contributor;*
- Underpinning care and action for others and the environment with a desired student outcome: *an active global citizen*

WHY ARE THESE (THEMES/OUTCOMES) IMPORTANT FOR CHILDREN IN 21ST CENTURY?

A number of policy issues call for more radical approaches to reverse some threats to children and young people over the coming decades. At a global level the United Nations Convention for the Rights of the Child (UNCRC) (2009) asserted the right of all children to play and learn freely in safe environments that "the best interests of the child shall be a primary consideration" including "the right to freedom of expression", "the enjoyment of the highest attainable standard of health" and "measures to encourage regular attendance at schools and the reduction of drop-out rates". Article 29 of UNCRC summarises the role of education to be:

(a) The development of the child's personality, talents and mental and physical abilities to their fullest potential;

(b) The development of respect for human rights and fundamental freedoms, and for the principles enshrined in the Charter of the United Nations;

(c) The development of respect for the child's parents, his or her own cultural identity, language and values, for the national values of the country in which the child is living, the country from which he or she may originate, and for civilizations different from his or her own;

(d) The preparation of the child for responsible life in a free society, in the spirit of understanding, peace, tolerance, equality of sexes, and friendship among all peoples, ethnic, national and religious groups and persons of indigenous origin;

(e) The development of respect for the natural environment.

This discourse of rights and responsibilities also chimes with recent policy emphasis in the UK on character education. The Jubilee Centre framework for character education in schools (2015:3), states that 'The ability to learn from experience (and make mistakes) is at the centre of it. To live with good sense is to be open-minded, to recognise the true variety of things and situations to be experienced. To live without 'good sense' is to live thoughtlessly and indecisively'. Yet diverse environmental, economic and societal challenges, such as climate change (Burgess 2013), poverty (MENE 2014), fear of risk (Gill 2007) and stress on educational attainment (Waite 2010) have reduced opportunities for policy makers and schools to capitalize on the demonstrated value of natural environments. Reduced opportunities to reap the benefits of engagement with the natural environment are mirrored by low rankings for health and happiness of children in the UK relative to economic prosperity measures (Marmot 2010; ONS 2014). However, as demonstrated in this report and in the wider literature, enhancing the children's quality of life can all be addressed powerfully through various forms of learning outside the classroom in natural environments. In the sections that follow, we outline relevant priorities and policies as a rationale for why an investment in time and resources to embed outdoor learning for all children would support their achievement.

ENCOURAGING HEALTHY BODIES, MINDS AND POSITIVE LIFESTYLES

The health of the nation is becoming an increasing concern for the UK government and for other countries, as the global economic situation places pressures on budgets. In the UK, where the National Health Service struggles to respond to the demand for services, the economic crisis is paralleled by a desire to invest more in preventative strategies towards health and wellbeing to pre-empt the development of serious illnesses (NHS England 2013). Increasing physical activity, for example, has been identified as having a significant function in the avoidance of obesogenic diseases such as Type 2 diabetes (All Party Commission on Physical Activity 2014). Yet, over one quarter of children between the ages of seven and twelve spend less than 30 minutes a day in the fresh air (Wood et al 2012) and fewer than one third of British children and young people participate in the recommended level of one hour's physical activity each day (Public Health England 2014).

In 2015, Public Health England conducted a rapid evidence review of the positive effects of physical activity on children aged 5-11 to inform their Change for Life public health campaign (Chalkley et al. 2015). They found the evidence base was particularly strong for physiological outcomes of cardio-metabolic health, muscular strength, bone health and cardiorespiratory fitness. Psychological outcomes of enhanced self-esteem, cognitive functioning, attention/concentration, academic achievement and reduced levels of anxiety/stress were also well supported, along with social outcomes of confidence and peer acceptance.

The Marmot Review in 2010 included six policy objectives to address health inequalities:

1. Give every child the best start in life
2. Enable all children, young people and adults to maximise their capabilities and have control over their lives
3. Create fair employment and good work for all
4. Ensure healthy standard of living for all
5. Create and develop healthy and sustainable places and communities
6. Strengthen the role and impact of ill-health prevention.

This review has been influential in encouraging greater cross-sector working to achieve healthy outcomes for children.

It is argued that participatory community engagement and partnership working are essential to deliver these objectives. Closer working between education and health to stimulate physical exercise would enable less stigmatising universal approaches to realising some of these ambitions, and evidence is strong for the value of nature for stimulating physical activity (Pretty et al. 2009; Natural England 2009). For example, in the Woodland Health for Youth project (Aronsson, Waite & Tighe-Clark 2015), curriculum learning in woodland environments was shown to include significantly more moderate and vigorous physical activity than either classroom-based or outdoor learning in the school grounds. Furthermore the increased levels of physical activity were more evenly distributed amongst children compared to break times, during which sedentary children tended to remain static. The cross-disciplinary researchers, which included a school nurse, suggest that the longer term effects on childhood obesity of stimulating physical activity through embedding learning in natural environments across the curriculum could be monitored through the National Child Measurement programme. An embedded cross curricular educational approach would also promote more equal access for those children that dislike PE (Dobbins et al. 2009), and girls who are frequently less active than boys in organised sporting activities. Lovell (2009) found that gender differences were less marked in forest school-based physical activities.

Recent international research has also provided evidence that exposure to green environments improves children's academic results and memory. Positive effects of being outdoors on memory were noted in qualitative study of both children's and adults' memories by Waite (2007). Wu et al. (2014) investigating the effects of surrounding greenness on the academic performance of the 3rd grade students in Massachusetts over a six year period, showed that students with higher exposure to greenness show better academic performance in both English and Maths. Research by Dadvand et al (2015) with 2,593 primary school age children in Barcelona involving comprehensive characterization of adjacent green environments (at home, school, and during commuting) and repeated computerized cognitive tests in schoolchildren, found an improvement in the children's cognitive development associated with surrounding greenness, particularly in schools. Over the study period, participants' overall working memory increased by an average of 22.8%, and superior working memory by 15.2%, while inattentiveness decreased by 18.9%.

This association was partly mediated by reductions in air pollution. These findings provide policymakers with evidence for feasible and achievable targeted interventions such as improving green spaces at schools to attain improvements in mental capital and cognitive development at the population level.

DEVELOPING SOCIAL, CONFIDENT AND CONNECTED PEOPLE

Recently, another major health and wellbeing issue for young people has been reported as social isolation and exclusion (Youth Access 2015). Without developing strong social skills and the ability to connect with others, people's lives are likely to be compromised in terms of happiness or perceived wellbeing and health. This is compounded by structural inequalities that limit self-confidence because of a lack of chances to succeed academically and economically (Quinn 2012). However, research has shown that resilience and self-determination can sometimes be achieved even in the face of difficult external circumstances (Biesta & Tedder 2007; Gutman & Schoon 2013). Their work demonstrates that non-cognitive skills are implicated in individuals' success in education and more broadly, in their positive functioning in society, a form of wellbeing known as eudaemonic. In the UK, the All Party Parliamentary Group (APPG) on Social Mobility reported on evidence linking the capacity to overcome adversity to the development of social and emotional skills, such as empathy and positive social relationships and perseverance, resilience and self-control (Paterson et al. 2014). Block et al. (2012) noted in their study of a structured school garden and food intervention that the programme attributes most highly valued by participants were increased student engagement and confidence, opportunities for experiential and integrated learning, teamwork, building social skills, and connections and links between schools and their communities. Waite, Rogers and Evans (2013) found that schoolchildren more actively negotiated between peers to manage their social and learning intentions in outdoor spaces. Outdoor learning in natural environments has thus been shown to address many of these vital social qualities that underpin success in learning and interpersonal relationships.

The Policy Context (What outcomes are required?)

STIMULATING SELF-REGULATED AND CREATIVE LEARNING

Performance standards are a top priority for the UK government but have proved fairly resistant to change despite a number of initiatives to improve them (Patrick, Ford & McPhee 2003). The Literacy and Numeracy Strategies implemented from the late 1990s to around 2010 in England prescribed teaching methods as well as intended outcomes but many commentators have argued that such an approach does not raise standards overall and may indeed constrain more successful and creative teachers (Sawyer 2004). Furthermore this approach may also discourage creativity and flexibility on the part of learners to the respond to rapidly changing and uncertain contexts within which knowledge and skills are and will be used in the future (Jeffrey & Woods 1997). The Educational Endowment Foundation in the UK which funds 'what works' research to provide evidence to inform teaching, reports an 8 month advantage for pupils who experience more metacognitive self-regulated learning. This is where pupils take a more active role in their learning, setting their own targets, evaluating their own academic development, and demonstrating greater intrinsic motivation for learning (EEFb 2015). Additionally, in terms of stimulating greater creativity, research evidence supports that creativity is nurtured by freedom and stifled by the continuous monitoring, evaluation, adult-direction, and pressure to conform as can be common through modern restrictions in children's lives. In the real world few questions have one right answer; few problems have one right solution; that's why creativity is crucial for children's academic success and their subsequent employability and happiness. Depriving children's access to free time in and outside of school to play and explore means they are not developing their full creative potential (Kim 2011).

Self-directed learning is commonly observed in and supported by outdoor learning contexts, where the new environment for learning encourages teachers to use more child–centred pedagogies (Waite et al 2013; Aasen et al 2009) and for children to be curious and self-motivated (Waller 2007). Waite (2013) suggests this pedagogical shift is due to the variable 'cultural density' of outdoor places. She is referring to the extent to which particular ways of being and behaving are established in places. Community spaces, for example, can provide access to other valued rich and dense 'funds of knowledge' (Moll et al 2013) from family and community practices. Novel learning contexts, on the other hand, may offer a cultural lightness, where teachers and pupils are less bound by institutional or familial expectations and can co-construct new ways of teaching and learning, thus stimulating greater creativity in both. A recent study in the USA is one of the first to try to scientifically grapple with the question of how an increase in scheduled, formal activities may affect the way children's brains develop. The study results illustrated that children who spend more time in less structured activities such as playing outside are better able to set their own goals and take actions to meet those goals without inputs from adults. The researchers argued these types of executive function or self-management, developed in childhood, also influence important outcomes, like academic performance, health, wealth and reduced criminality, years and even decades later (Baker et. al 2014). Williams and Dixon (2013) in a US review of academic outcomes from school gardens also found positive impacts on direct academic outcomes particularly for science followed by maths and language. Social development was also a frequent positive outcome noted in this study. Learning in natural environment has thus been linked with the development of self-regulated learning, creativity and academic attainment (Kim 2011).

SUPPORTING EFFECTIVE CONTRIBUTIONS AND COLLABORATION

There has been much made of the lack of employability skills in students emerging from the education system (e.g. CBI 2011), although McQuaid and Lindsay (2005) amongst others have argued that individual skills form only part of the matrix of employability. However, it seems that the factor of 'critical importance' to employers recruiting young people is a good personality and attitude, including motivation, flexibility and an ability to learn (UK Employer Perspectives Survey (EPS) 2010). Furthermore the British Chamber of Commerce found that more than half of the businesses (57%) in their survey attributed why young people were not 'work ready' to a lack of soft skills, such as communication and team working (BCC 2014). 'The All-Party Parliamentary Group (APPG) on Social Mobility believes that if our education system also focussed more on these so-called "soft skills", young people would leave school and university much better equipped to face life and its challenges' (Paterson, Tyler & Lexmond 2014: 6). The National Careers Service (NCS no date) suggest that these skills: communicating, making decisions, showing commitment, flexibility, time management, leadership skills, creativity and problem-solving skills, being a team player, accepting responsibility and ability to work under pressure, are critical to finding employment, but they also point out that these are not quickly learnt but need to develop over a considerable period of time. However, they do not specify how this 'development' might occur. Character education is enjoying a revival in recognition that these skills underpin success in life as much, if not more, than academic attainment (Paterson, Tyler & Lexmond, 2014) and ample evidence exists that they are skills and competencies that are frequently fostered in learning outside the classroom, particularly within repeated outdoor and adventurous activities (English Outdoor Council 2015).

UNDERPINNING CARE AND ACTION FOR OTHERS AND THE ENVIRONMENT

In 2010, the Prime Minister David Cameron promoted the 'Big Society' and alluded to the breakdown in societal values that support community. One of the methods intended to build greater volunteerism was through the National Citizenship Programme (NCP) where young people aged 16-17 were supported to build team working skills and a positive attitude towards others and community involvement, often involving outdoor experiences and community projects. Its evaluation (Nat Cen 2013) reported most significant improvements in team building, communication and leadership skills. Qualitative evidence suggests that these improvements were due to them being able to try out their communication skills with peers before familiar adults and, eventually, in front of wider community stakeholders. Residential experience, in particular, took participants out of their comfort zone, working with people they did not know but within a supportive environment. In the final element of the programme, young people became leaders and were encouraged to reflect on their leadership behaviour. One of the successful aspects of pedagogy for NCP was creating a balance between youth-led projects and appropriate levels of support.

The UK government also recently created policy around valuing the natural environment as part of integrated physical and cultural ecosystem services within the broader global sustainable development agenda (HM Government 2011). In 2011, the UK Government published the Natural Environment White Paper *The Natural Choice: securing the value of nature* (HMG 2011: 47) which included the ambition that "Every child should experience and learn about the natural environment" with a commitment to "remove barriers to learning outdoors and increase schools' abilities to teach outdoors when they wish to do so."

The Policy Context (What outcomes are required?)

One of the outcomes of the White Paper was the development of the Natural Connections Demonstration project (2012-16), based on detailed insight studies of the barriers for schools of introducing greater opportunity for their pupils to learn in natural environments (Kings College London 2010; 2011). Natural Connections is a large-scale, four year demonstration project commissioned by DEFRA, Natural England and English Heritage, and led by Plymouth University's Institute of Education. The project operates through 'hubs' across the South West of England: Cornwall, Plymouth, Torbay, North and East Devon, Bristol and North Somerset. It uses an ecological model, which brings together schools and outdoor learning providers at a local level to identify, and work to overcome, barriers to learning in natural environments and to support and embed increased use of local green spaces for learning across the curriculum (Natural Connections, no date). Findings confirm that the increased use of curriculum learning in natural environments in participating schools is resulting in greater pupil engagement, enjoyment of lessons and environmental awareness, and improved social skills, health, wellbeing and behaviour (Waite, Passy, Blackwell and Gilchrist 2016). Over half the teachers also specifically link children's outdoor learning experiences to higher educational attainment, showing that the lessons not only address the development of environmental attitudes and soft skills that are foundational to learning but also educational outcomes directly (Ofsted, 2008; 2013). Regular outdoor curriculum learning has thus been demonstrated to contribute significantly to multiple desired outcomes. In this report, we term this suite of potential outdoor learning forms, 'Natural Schooling'.

TOWARDS A FRAMEWORK FOR 21ST CENTURY STUDENT OUTCOMES FROM OUTDOOR LEARNING

Table 1 below shows how desired student outcomes grouped within five themes mapped to policy drivers can be achieved and supported by forms of outdoor learning practice, underpinned by evidence from international research. Inevitably, a framework simplifies alignments and currently this is based upon readings of the evidence from reviews, policy analysis and this conference that brought together key international researchers. It is intended to form a foundation for theories of change that further research and debate will refine.

Table 1: Framework for 21st Century Student Outcomes from Outdoor Learning

The Policy Context What (Themes /desired student outcomes)	**The Research Context Why (evidence/research/ literature/theory)**	**The Practice Context How (Outdoor Learning form/ place/ pedagogies/ people)**
Theme 1: Encouraging healthy bodies and positive lifestyles Desired student outcome: *a healthy and happy body and mind*	Role of Green restorative theory/ADHD/ anxiety/depression Active bodies/ motor skills/ physical fitness/skills development Healthy foods/gardening Outdoor living skills	Experiential learning in natural settings Outdoor education/learning LOTC Vegetable gardens
Theme 2: Developing social, confident and connected people Desired student outcome: *a sociable confident person*	Human social relations Independent and critical thinking skills Problem solving Social development Resilience- building	Problem based learning Project based pedagogies Social learning Residential programs
Theme 3: Stimulating self-regulated and creative learning Desired student outcome: *a self-directed creative learner*	Taking responsibility for own learning Self-regulation/self-awareness Self-management, self-efficacy Curiosity/inquiry Creativity	Inquiry learning Self-directed learning 'Adventurous' education Play pedagogies Wild free - nature play Cross-curricular and interdisciplinary learning STEAM outside
Theme 4: Supporting effective contributions and collaboration Desired student outcome: *an effective contributor*	Team building Leadership skills, development Risk assessment/taking calculated risks Innovator/entrepreneur Responsible decision-making, social resilience, collaboration skills.	Adventure education Residential programs Problem based learning Team building Field trips Service learning
Theme 5: Underpinning care and action for others and the environment Desired student outcome: *an active global citizen*	Appreciation of national and natural heritage Understanding issues of globalisation, cultural diversity and sustainable futures Environmental stewardships Volunteerism Empathy/care for more than human world Active environmental citizenry Contributing to planetary issues	ESD/EE Geography & Science Field trips Global education Indigenous studies International studies Animal husbandry Place based learning

The following section provides an overview of the 21 international presentations in the *Lessons from Near and Far conference* with some other related research to illustrate the interface of research with practice. The evidence tables in Appendix 1 summarise these in terms of international policy contexts, studies of pedagogies, place and student outcomes within these themes (where known). It is by no means a comprehensive list of relevant research at present, arising as it does principally from reflections on the *Lessons from Near and Far conference* in July 2015, but as with the framework above, it should provide a starting point for an ongoing database that will help to identify research deficits, provide robust aggregation of evidence related to desired outcomes and so inform policy and practice decisions for clearly delineated purposes.

THE PRACTICE CONTEXT

HOW CAN DESIRED POLICY OUTCOMES BE SUPPORTED THROUGH APPROPRIATE PLACES, PEDAGOGIES AND PEOPLE?

O'Brien et al (2016) suggest that the following simple structure may be useful in planning learning outside the classroom to meet specific goals:

- Purpose – what? why?
- Place – where?
- Pedagogy - how?
- People – who?

We used these questions to examine reports of research presented at the *Lessons from Near and Far conference* to identify the relative appropriateness of proposed outdoor learning practice and this analysis is attached in Appendix 1. In this section, we synthesise some of the research presented at the conference that links particular pedagogical approaches and practices (The How) with the desired student outcomes (The What) identified in Table 1.

WHAT OUTDOOR LEARNING PRACTICES LEAD TO A HEALTHY AND HAPPY BODY AND MIND?

Evidence was presented that showed how outdoor learning helped create healthy and happy learners. Using a dynamic systems approach to learning, and arguing that children's development is a joint function of the person and the environment, Fjørtoft's Norwegian research (Fjørtoft 2004) showed how children use natural features for climbing, sliding, balancing and other activities, thereby encouraging movement and improving motor skills. Outdoor learning's links with physical education were demonstrated by Gray in the Australian curriculum, which aimed to be 'challenging, enjoyable and physically active'. She addressed how personal, social, cultural and environmental factors influence health and wellbeing (Gray and Martin 2012). In the UK, Blackwell and Passy reported that 96 per cent of responding teachers (N=85) in the Natural Connections evaluation believed that learning outside improves children's health and wellbeing (See also O'Brien et al. 2016) through increasing physical activity and increasing enjoyment. Khan in Bangladesh and Lloyd from Australia found that primary pupils reported higher levels of wellbeing when they learned outside in areas that promoted playful and exploratory learning and were active in familiar places (Lloyd and Gray 2014). Bortolotti working with Italian kindergarten reported an increased 'sense of wellbeing' in his research on outdoor learning (Bortolotti, Crudeli and Ritscher 2014). The evaluation of the intervention found impacts in terms of improved sense of well-being, stimulated learning and better socialisation.

WHAT OUTDOOR LEARNING PRACTICES LEAD TO A SOCIABLE, CONFIDENT PERSON?

There were studies presented that showed how successful outdoor learning contexts were in developing children's social skills and confidence. For example, Fuller's participants from highly deprived communities in Reading, England took part in repeated residential outdoor education programmes and reported higher confidence levels and improvement in relationships both at home and in school as a result of their experience. Loynes' evaluation of the Paul Hamlyn Foundation Learning Away residential development programme (Kendall and Rodger 2015) found a greater sense of cohesion and belonging among young people who had attended residentials designed by their own teachers. Both Loynes and Fuller found experiences afforded by overnight stays also supported the development of other skills and productive teacher/pupil relationships. According to Blackwell and Passy responding teachers from the Natural Connections Project in the southwest of England reported that children's social skills were improved through curricular learning outside, often as a result of changing patterns of interaction; while Khan's research in Bangladesh showed children in developed outdoor learning environments were more willing to participate in lessons and talked to their parents about their learning. Bortolotti found Italian children showed greater social skills in a kindergarten where teachers engaged in professional development to enhance their skills in facilitating learning outside.

WHAT OUTDOOR LEARNING PRACTICES LEAD TO A SELF-DIRECTED AND CREATIVE LEARNER?

Substantial evidence was presented for the utility of learning outside the classroom for encouraging children's greater metacognition (thinking about their learning processes) and self-regulation (taking responsibility for their learning). Drawing on the context of a system in which standardised testing limits teachers' capacities to respond to students' needs, and in which life more generally is characterised by 'uncertainty, change and complexity', Beames advocated for more adventurous learning, both inside or outside of the classroom based on his work with a colleague from New Zealand (Beames and Brown 2016). This type of learning, featureing of uncertainty, agency, authenticity and mastery, is aimed at creating contexts and methods for 'deep and meaningful learning' which 'elicits creative responses from students imagining solutions, refining ideas and putting them into practice'. Pedagogy as problem-based rather than location *per se* appeared foremost in Beames' thesis. Other research has, however, noted that teaching inside schools frequently influences the use of transmissive or 'delivery' teaching styles but that a new location can disrupt these habitual patterns and encourage more self-regulated learning (Waite 2013).

The theoretical approach of experiential learning was also supported by empirical work from Loynes, Blackwell and Passy, Fuller, Khan and Lloyd, whose findings demonstrated that learning outdoors can lead to higher engagement with learning and higher attainment through hands on activity. Loynes' evaluation of UK residential camps, in which students experienced a wide variety of pedagogies that included new experiences and ways of learning such as camping, film-making, making fires, storytelling and living history, demonstrated 'ten times better comprehension and four times better retention across all curriculum areas' in one school, and accelerated learning of underachieving maths students in another. Fuller's research on residentials found similar results from adventure activities such as rock climbing and night forest walks, with 'significant' improvement in participants' academic grades. In this work, appropriate levels of challenge and risk seemed to be an important aspect in stimulating young people to engage more with learning, possibly through building resilience and grit.

McCree's Wiltshire-based project, involving pupils who were 'struggling to thrive' at school with learning outdoors and Forest School, gave children a choice of activities with the aim of encouraging self-direction, self-expression and self-regulation. Children and adults made fires, dens and dug holes, made films and other kinds of art, told stories, engaged in imaginative play, and visited nature reserves and woodland. Her evaluation showed that 'nurture' and 'social time' were two of the most popular experiences with children, suggesting that autonomous choices could help teachers fulfil children's learning needs more responsively. Similarly Bortolotti's project of in-service teacher training for outdoor learning in kindergartens around Bologna, showed that children's learning was stimulated by well-designed outdoor learning experiences. Lloyd's research in an Australian primary school focused on constructivist learning theories, using experiential education to link place and indigenous culture for a group of primary pupils. She found an increased engagement with learning among participating pupils, a similar result to that of Khan, who redesigned one school's grounds in Bangladesh and in a quasi-experimental research design, monitored the results of children who had lessons and played outside against those who only played outside and a group from another school that had not had the grounds re-designed. She reported that the group of children who also had lessons outside enjoyed learning more, had better attendance and had higher retention of their learning. These positive results were further supported by Blackwell and Passy's report on the Natural Connections Project, where 92 per cent of responding teachers stated that curricular learning outside increased pupils' engagement with learning and over half believed that outdoor learning supports higher attainment.

The Practice Context

WHAT OUTDOOR LEARNING PRACTICES LEAD TO AN EFFECTIVE CONTRIBUTOR?

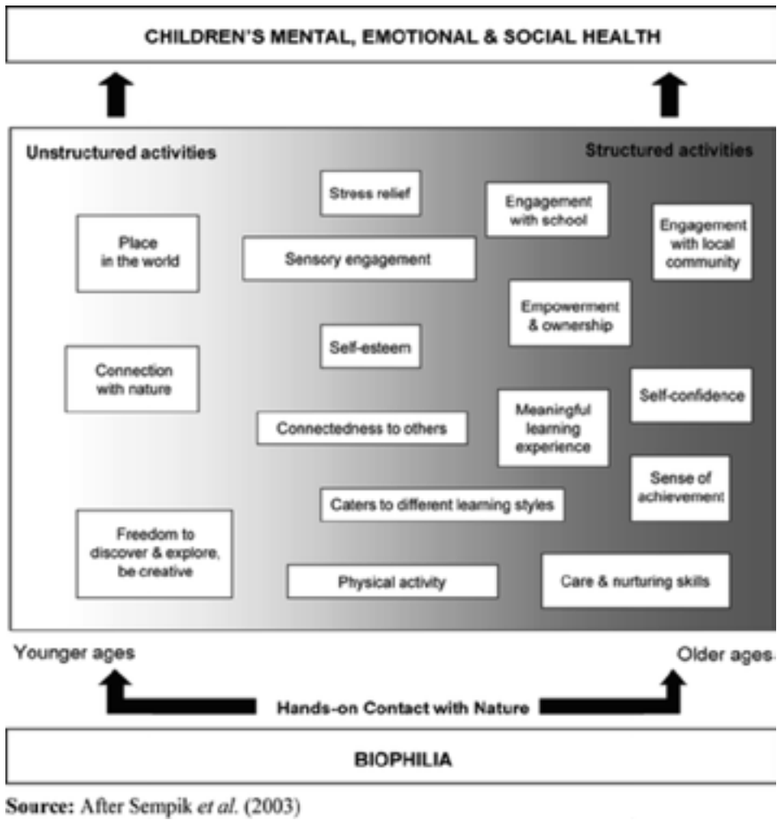
Several presenters also identified how valuable learning outside the classroom was for encouraging greater involvement and contribution, with residential experience being particularly highlighted. Residential stays, in which pupils and staff work together, were found by Loynes and Fuller to encourage leadership and the capacity to take calculated risks in adventurous activities. These residential and adventurous experiences were seen to support the development of effective contributors. Kerr's project in Ireland *Science Teaching for Transition in the Outdoor Classroom* developed in-service training including co-teaching by secondary school teachers for science teachers, with a focus on learning outdoors and supporting children in their transition to secondary school. Her research indicated that the teamwork involved encouraged both teachers and pupils to be motivated and excited by learning outside; an effect on teacher satisfaction and pupil engagement also noted within the Natural Connections project.

WHAT OUTDOOR LEARNING PRACTICES LEAD TO AN ACTIVE GLOBAL CITIZEN?

How outdoor learning supported the development of the active global citizen through place-sensitive pedagogy was addressed specifically in some presentations, but was also implicit in several others. Encouraging children and young people to form relationships with local places and to develop a connectedness with nature can awaken them to global issues in the longer term (Davis 2015), and Lloyd's work with Australian primary children, together with Nugent and MacQuarrie's with kindergartens in Scotland, Finland and Denmark in which children learn within a 'pro-nature, pro-environmentally committed community' may well have this indirect effect. Burfield's methodological work based in the UK in finding a robust and appropriate measure for establishing children's connection with nature could prove useful in assessing this relationship. Swedish researchers, Szczepanski and Andersson, reiterated the value of time in nature for education for sustainability outcomes when they argued for the importance of 'the authentic place-related meeting, without intermediation, in the outdoor environment'. Confirming Maller's thesis (2009) that unstructured activities may contribute more significantly than structured to this outcome, O'Malley pointed to some difficulties in providing this type of teaching when she criticised current environmental education in Ireland for its constraint through close alignment with mainstream education goals.

More direct work on education for sustainable development was discussed by Gabrielsen, whose research investigating teachers' rationales for using local learning arenas for education for sustainable development (ESD) in Norway showed that teachers used these arenas to exemplify different ESD perspectives because they offered opportunities for direct environmental action. Kerr's science project echoed these findings, with her participants showing greater environmental awareness following science lessons taken outside. A similar finding, reflecting on the Australian geography curriculum which aims to develop 'informed, responsible and active citizens who can contribute to the development of an environmentally and economically sustainable and socially just world' was reported by Gray.

In **summary**, the conference presentations, coupled with the growing body of evidence from other related research studies, strongly recommend that nuanced approaches are most successful in achieving particular outcomes for students. This echoes Maller (2009) who, looking at benefits for children's mental, emotional and social health of hands-on nature activity at school, found that different forms of outdoor learning led to different outcomes. More structured activities appeared to support community involvement and engagement with learning while less structured ones were linked to a sense of place, creativity and self–esteem (See **Figure 2** from Maller 2009: 537 below). Pedagogies interact with place to produce different outcomes. Thus considering levels of structure, regarding both the pedagogical approach and the context of learning, would support policy and practice decisions about appropriate forms of outdoor learning, so that they are better conceptualised and planned for progression through different developmental stages. For example, play-based pedagogies in early and primary years may lay foundations for later service learning opportunities. This points to distinctive opportunity for 'Natural Schooling' to address societal needs in a progressive manner.



Source: After Sempik *et al.* (2003)

Figure 2: Different forms of outdoor learning and their different outcomes (from Maller 2009: 537)

IMPROVING THE POLICY/RESEARCH INTERFACE

WHAT ARE THE SIGNIFICANT ISSUES TO BE ADDRESSED TO SUPPORT A PRODUCTIVE RESEARCH/POLICY INTERFACE?

In addition to discussion of evidence and pedagogical approaches this conference was intended to focus specifically on developing a productive interface between research and policy through consideration of different international contexts. A number of papers highlighted national differences in social attitudes, expectations and policy direction.

Barford and Bentsen illustrated how and why the Danish government is investing in outdoor learning. The new Danish curriculum was introduced in 2013 and includes a longer and more varied school day; more PE, physical exercise and activity; and the "open school". The longer day for Danish children is usually only between 8am and 2-3pm, but nonetheless is intended to create time for a range of pedagogical approaches. The required "greater variety" element supports using alternative teaching methods to children being sedentary and relatively passive within school. More PE, physical exercise and activity is operationalised with every child being physically active for an average of 45 minutes per day through sports, PE or udeskole (learning outside the classroom). The "open school" refers to schools using the surrounding community as a part of their teaching context, e.g. sports clubs, museums and parks. Clearly these Danish government policies aligned well with udeskole, a form of curriculum learning outside the classroom, and their Ministry of Education had also invested in a programme of CPD to expand what initially arose as a locally determined pedagogical method.

Ho discussed the increasing importance of outdoor learning to Singapore's Ministry of Education, drawing attention to the centrality of training for teachers and of research to inform policy and practice. The policy presented was part of a highly regulated top down educational system and the methods to be used were the subject of central training to achieve well-defined intended outcomes. This resulted in strong integration of its aims and high fidelity within its implementation. The development, using international evidence and practice from the UK, Denmark, Germany and Australia, is working towards a national outdoor education master plan to ensure these benefits for Singaporean children.

In the absence of strong educational policy support in the UK, Williams' research illustrated a higher rate of outdoor learning 'than we might reasonably expect', supported by a large number of highly experienced outdoor learning providers external to the school system. Williams went on to argue that, although there is a shared understanding that outdoor experiences are worthwhile, further quantitative evidence is needed to influence policy-makers and headteachers of the benefits of outdoor learning in England and that this might be facilitated by closer working between these third party outdoor learning providers, researchers and schools. Loynes' report of 'Learning Away' catalogued the multiple benefits evidenced in this ground up approach to using residential experience to enhance educational and wellbeing outcomes, whereby teachers developed the programmes. This echoed key findings of the Natural Connections project that these outcomes were multiple and grew more successfully within and across schools where there was also senior management support.

Gray's account of the different initiatives including social media taken to ensure that the word 'outdoors' featured in the final draft of the Australian Health and Physical Education curriculum demonstrated the struggle it can take to convince some policy-makers of how outdoor learning is fundamental to children's educational experience. The importance of getting recognition within policy documents was stressed in order to ensure that this valuable teaching resource was embedded within school policy and practice.

Thus, the most successful interventions combine ground up values and top down policy support to work with local culturally determined priorities and barriers. The implications

of this for the research/policy/practice nexus is that practice relies on evidence to shape it but its uptake and embedding is accelerated by policy support derived from better understanding of the pathways to impact. In order to determine how policy support might be further developed, we consider the different ways in which research and policy interface in the next section.

WHAT IS DRIVING THE RESEARCH-POLICY INTERFACE?

The following diagram developed by Rickinson and Hunt (2013) for the Strategic Research Group for LINE, drawing on the work of Nutley et al. (2007), provides an overview of the interface between research and policy. Within this diagram we see the importance of considering various types of research and the different ways this research can respond to a variety of policy contexts. In particular it focuses on the needs of policy makers at different stages in the policy process. So, in line with wider work on evidence use in different contexts (e.g. Estabrooks 2001), the uses of research for policy influence might be described as:

Conceptual use – that is research that raises questions, *'the complex and often indirect ways in which research can have an impact on the knowledge, understanding and attitudes of policy makers [...] where research changes ways of thinking'*

Instrumental use – that is research that provides answers, *'the direct impact of research on policy decisions [...] the influence of a specific piece of research in making a specific decision or in defining a solution to a specific problem'*

Strategic use – that is research that is responsive and dialogic, 'research that informs and responds to changing political landscapes'

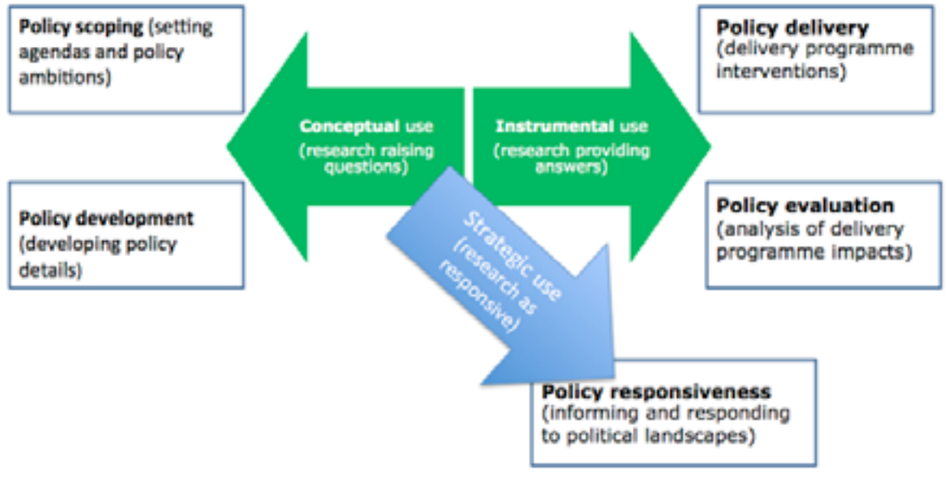


Figure 3: Policy/research interfaces (Rickinson and Hunt, 2013, adapted from Nutley et al. (2007)

There is a widespread perception that policy makers prefer long term and large scale randomised control trial (RCT) designs as evidence, while academic research funding emphasises innovation and creativity in research methodologies. Yet Nutley et al (2006) suggest that RCT evidence is not universally appreciated and many policy makers also look for the following in research communication: credibility and trust in the research; and its timeliness, relevance and appropriate contextualisation. Presentation and guidance on how to enact findings were also deemed influential but crucially, and perhaps unsurprisingly, dialogue appeared to be highly valued for improving mutual understanding of policy needs and implications.

This dialogue would be supported by greater clarity and to maximise the usefulness of their research for policy impact, questions for researchers might include:

- What do policy makers want to do with existing research findings?
- How can policy makers' ideas be supported and developed into robust research questions that will probe issues further and lead to highly relevant and deeper understandings for society?
- What medium of delivery of research will create the most "compelling case" for specific policy contexts and what will provide the detail to guide implementation?
- How can we nurture or challenge ideas to work with the drivers within society that are most influential in influencing policy conversations regarding education, health and society?
- What policy narratives across different areas of public policy can existing and future outdoor learning research contribute to and/or challenge?

The last of the above questions stems from studies of policy-makers in Europe (Boswell 2009; Boswell et al. 2011) and Australia (Rickinson et al. 2016) which highlight 'policy narratives' as an important factor shaping the use (or otherwise) of evidence in the policy process. It relates to the responsive dialogue indicated by the blue arrow in **Figure 3.** The Australian study, looking at evidence use in educational policy development, shows how research evidence was being used: to support and elaborate the policy narrative (e.g. evidence to flag a case for change; evidence to clarify international practice, and evidence to elaborate the narrative); and to question and challenge the policy narrative (e.g. evidence to keep things on the agenda, evidence to challenge assumptions, and evidence to challenge proposals).

Communication is critical. Researchers need to communicate to policy makers the meaning and implications of research findings for policy and practice and where the gaps in our knowledge and understanding still lie. To be strategic in research, researchers need to bring together widely diverse isolated studies and consider ways to join these pieces of the jigsaw puzzle to make coherent sense to policy makers by providing the bigger picture. In the UK, the *Teaching and Learning Research Programme* and the Research Councils UK call around *Valuing Nature* represent attempts to do this through programmes of research with a common focus. Another cost effective solution would be to have a centre, whose remit included maintaining a database of relevant research, regularly synthesised and circulated to user group partners, similar to the University of Bristol research summary service. This happens to an extent at a local level within Plymouth University's outdoor and experiential learning research network https://www.plymouth.ac.uk/research/oelres-net as one example, and at a national level, through Natural England's sponsored Strategic Research and user groups in Learning in Natural Environments and Outdoors for All. Other organisations such as the Council for Learning outside the Classroom and the Institute of Outdoor Learning also provide accessible summaries of policy and key research reports. However, as the recent systematic review for the Institute of Outdoor Learning funded by the Blagrave Trust (Fiennes et al 2015) comments, aggregation of evidence is currently limited and lacks a clear articulation of its implications to guide research agenda or strategic prioritisation for decision making or funding.

Researchers should also consider how to be proactive rather than only reactive in their research-policy endeavours. Researchers need to open communication channels with local, regional and national policy bodies and enter dialogues with policy makers where they can help to identify the policy gaps through conceptual research to support policy development. This should be fundamental to any robust evidence base and as significant as research that is responsive to policy initiatives, but it can be challenging to establish and source funding for this.

WHY RESEARCH IS STILL NEEDED

This leads us to consider some of the research gaps for Learning in Natural Environments. Some have been mentioned above and they include:

- Lack of studies that are significant in scale and substance with a strong empirical component.
  This challenge is partly attributable to problems of achieving adequate funding to tackle this sort of research over a sufficient time scale.
- Most research is small scale and does not build effectively on previous research projects.
  This problem is being partially addressed through the Natural England Strategic Research Groups, but further investment to aggregate and synthesise study findings would benefit a more coordinated evidence base.
- Lack of comparability between empirical data sets that are piecemeal, specific in focus or limited in applicability.
  The development of common tools for measurement of wellbeing, for example, is increasing but many funding bodies preclude applying for research which seeks to replicate other work in different contexts or to confirm the robustness of findings; innovation and originality are frequently criteria for success. Nevertheless detailed reporting according to a common framework could help synthesis across more innovative research studies; a template for this could be constructed and studies could then feed into a common database so that meta-analyses were facilitated.

Although Gill (2011) conducted his review on child-nature engagement research not just specifically on learning in natural environments, it is helpful to note his observations in terms of exploring the gaps. He suggests the most robust evidence of effects is gained from studies where children are assigned randomly to different interventions in randomised controlled trials and that more longitudinal research, ideally using control groups, would help unpick impacts of different kinds of intervention.

In the review by Malone (2008), gaps identified other than the approach to the research, concerned the research context. Most of the research being conducted in primary school and early childhood, and there was a lack of studies in secondary schools in particular with older groups. The studies tended to be multi-method with some of the best evidence being available in Museum education. This raises the question why the museum education research is better funded, or is of more interest to researchers than outdoor education. Yet the later review by Fiennes et al (2015) suggests that the majority of studies focus on older children and adventure activity. Analysis of proposals and success rates could help to unpick these anomalies.

In terms of methods of embedding outdoor learning in school provision, a grounded approach with schools owning development, such as that used for the Natural Connections Demonstration project in England and udeskole in Denmark, is very important as values have been demonstrated to be a powerful force to embed and sustain change. However, schools face many pressures and a key enabler would be if learning outside the classroom in natural environments was enshrined in policy and inspection frameworks (Waite 2010; Natural Connections final report 2016). Furthermore, acceleration of adoption can be seen in Denmark's udeskole which began as a grassroots movement but has been recognised and supported by the government and is being scaled up using continuing professional development (CPD); a similar effect arises through the significant investment in funding to support localised development of outdoor learning and the infrastructure of networking to spread good practice in Norway within the Sustainable Backpack programme. The example from Australia illustrates how absence from key

Improving the Policy/Research Interface

policy documentation is not neutral in effects but in neoliberal contexts of instrumental education, can effectively serve to excise vital experiences from children's lives. Finally, in Singapore, we see how international research evidence has been a powerful driver for policy and practice to extend opportunities to address gaps in educational outcomes for creativity and citizenship and character educational outcomes in what is lauded as a top performing educational system.

We conclude that schools and the initial teacher training (ITT) and continuing professional development (CPD) that support their development can be a valuable locus for innovation in outdoor learning activity, mediated by quality and commitment in the physical, managerial and teaching skills infrastructure, and can lead to a range of positive student outcomes. Moreover these outcomes can be reinforced by capturing evidence of impacts at both policy and practice levels. Our Framework for 21st Century Student outcomes from Natural Schooling (**Table 1** p.22) effectively closes the circle for practice and policy decision-making by providing guidance on the types of outdoor learning most frequently associated with desired outcomes, thus signposting policy implementation routes. With modest funding and the long term support of the research and practice communities, the embryonic database in **Appendix 1** could serve as a repository to build a stronger and more nuanced evidence base.

IDENTIFIED CHALLENGES AND RESPONSES TO PATHWAYS TO IMPACT

POLICY CHALLENGES AND RESPONSES

Children have differential and inequitable access and quality of experiences to greenspace determined by a range of socioeconomic factors. According to the Natural Environment White Paper (2011:12), 'Children are becoming disconnected from the natural environment. They are spending less and less time outdoors. In fact, the likelihood of children visiting any green space at all has halved in a generation.'

Teaching and learning in natural environments offers one way to overcome barriers to attainment and social inequalities. 'Experience and a variety of evidence suggest that learning in natural environments (LINE) can be effective in delivering transformational change in outcomes for students and hence by inference to school performance (eftec, 2011:1) The policy challenge is to consider how to create a fair and equitable systemic response to children's increasingly sedentary and unhealthy lifestyles by supporting opportunities for children to engage with, play and learn in outdoor environments.

RESEARCH AND EVALUATION WEAKNESSES AND RESPONSES

Funding for research has led to smaller scale qualitative studies predominating. 'The qualitative evidence [for the value and benefits of LINE] is compelling, however, quantitative evidence linking LINE and changes in these benefits is lacking' (Dillon & Dickie 2012:3). Transformative impacts of learning in natural environments on children's lives cannot be fully tested by short term evaluations; longitudinal large scale studies are needed. 'Most informal learning providers struggle to isolate their impact beyond short-term effects [...] [What is needed are] larger-scale evaluation studies which could make a real contribution to the longer-term evidence base' (Lloyd, Neilson, King & Dyball 2012: Recommendation 3.2)

The challenge is that rather than a one size fits all approach to outdoor learning research and provision, research studies should focus on a variety of theories of change that identify an array of routes to particular desired outcomes in order to 'improve and deepen the research-based understandings of the outdoor learning process' (Rickinson et al 2004: 84), in particular 'a greater number of rigorous in-depth studies on outdoor learning in school grounds and community settings' (ibid: 6). These studies should be conducted in consideration of one another so they can come together to formulate the big picture of what is happening and identify where the gaps are.

RESEARCH-POLICY CHALLENGE AND RESPONSE

Constructing means of maintaining fruitful dialogue between policy makers at local and national levels and the research community would improve two way communication of relevant information and needs. 'Research findings do not automatically inform or shape policy or practice, and without specific efforts to strengthen those connections, even the most powerful research evidence will only have limited effect' (Campbell & Levin 2012). The challenge is to create regular opportunities where such dialogue is enabled.

What then are the potential benefits that an improved interface of research and policy could bring to outdoor learning? The following is a short list of possibilities:

- Nurturing of policy agendas that respond to societal needs/challenges
- Raising awareness of funding possibilities to fill the gaps in understanding
- Better targeted interventions that have a strong evidence base
- Building layers of evidence over time to evaluate longer term impacts
- Greater capacity for evidence use in the future.

We have identified specific policy arena where greater dialogue between researchers and policy makers would support better integration of evidence based practice in learning outside the classroom in natural environments to address societal needs.

- Public Health, including addressing health inequalities, obesogenic disease and mental health, hedonic and eudaemonic well-being (feeling and functioning better)
- Social cohesion and community connectedness, increasing social trust and social mobility
- Educational attainment, especially increasing engagement in and motivation for learning
- Employability skills, including supporting entrepreneurship, young people being creative and innovative thinkers, self-directed learners and expressing self-regulation skills.
- Community participation and active local-global citizenship
- Environmental agenda for supporting international sustainable development goals

In terms of looking to the future, there are a number of questions for policy makers that could initiate discussions on the research-policy interface:

- What evidence/research do policy makers think will have the most influence for them to address their political agendas?
- What format does information from research need to be presented in to maximize the likelihood of impact?
- What do policy makers want to do with the research that researchers are providing?
- How can policy makers' ideas/questions/needs be supported, challenged and developed to inform research agendas?
- How can communication between policy makers and researchers be made more effective to create a productive and regular interchange between research and policy?

This report has drawn together international research, policies and practice regarding learning in natural environments in order to highlight how we can better leverage access for all children and young people to its multiple benefits and align particular forms to specific outcomes more effectively. There is no doubt that outdoor learning and embedded 'Natural Schooling' progression can contribute to the identified policy aspirations for desired student outcomes and that investment in policy recognition and research funding would enable this valuable resource to be maximised.

RECOMMENDATIONS FOR IMPLEMENTATION

1. The framework for 21st century student outcomes from outdoor learning proposed in this report (**Table 1** p.22) should be refined and adopted by strategic authorities for policy and research in outdoor learning by 2017. For example, in England these would be the Department for Education, the Department for Environment and Rural Affairs and the Council for Learning Outside the Classroom.

2. A strategic policy/research hub for outdoor learning should be established using the proposed framework to collate existing research, prioritise future research needs and help to improve the alignment between research and policy. This should include membership from both education and natural environment sectors.

3. The outdoor learning hub needs the authority, skills and capacity to:

    a. Act as a central gathering point for evidence and policy
    b. Undertake horizon scanning across the research and policy domains
    c. Maintain a robust and searchable database of the evidence and policy links
    d. Produce syntheses of available information in formats that would be easily accessible to policy makers and practitioners.
    e. Respond to requests for meta-analyses to address specific research or policy questions and to identify specific research needs.
    f. Develop a research toolkit and a guide for practitioners that would enable small scale projects and research studies to be aggregated across different contexts to capitalise on the valuable qualitative insights from these projects.

4. The outdoor learning hub should specifically consider the need for longitudinal studies and Randomised Controlled Tests to provide statistically robust, long term comparative datasets for different forms of outdoor learning delivered in different cultural contexts, yielding the quantitative evidence that is often demanded by policy makers to inform and initiate transformational changes in the scale or quality of outdoor learning provision.

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APPENDIX 1: EVIDENCE BASED REVIEW OF CONFERENCE PAPERS & SUPPORTING RESEARCH STUDIES

1. ENCOURAGING HEALTHY BODIES AND POSITIVE LIFESTYLES WITH A DESIRED STUDENT OUTCOME OF A *HEALTHY AND HAPPY BODY AND MIND*

Research Study	Policy context	Purpose	Pedagogy	Place	Outcomes
Fjørtoft: *Learning Landscapes: a contextual understanding of children's interaction with outdoor environments* Studies: 2000/2007/2010/2015 Empirical – quasi-experimental study	Norway: physical activity for health	To show the importance of the landscape in promoting types of learning. Monitor motor skill development and physical activity	Children using environment features as functional; to climb, slide, balance, hide, build etc. 'Dynamic systems' approach to learning: 'development is a joint function of person and environment'	Trees, different landscape features, rocks, snow	Evidence of improved motor development, physical play; encourages physical activity
Gray: *Lessons from Down Under: Outdoor Education in the Australian Curriculum* Studies: 2012/ 2015 Political – policy review	Australia: the introduction of a National Curriculum in 2011/12 placed OE 'seriously under question'	To illustrate the initiatives taken by OEA to get the word 'outdoor' (originally mentioned once) to appear 23 times in the final H&PE curriculum F-Y10	Discussion of links between OE and geography, science, H&PE curricula	Natural, community and built environments	OE is a fundamental integrated forum for learning activities; outdoors central to F-10 education; need vigilance re implementation
Brussoni (2015) *Review Risky Outdoor Play and Children's Health* Review of 21 studies on risky play behaviours in Canada and USA.	Canada: Policy and practice precedents and recommendations for action are discussed	To examine the relationship between risky outdoor play and children's health and healthy behaviour	Children engaging in free, high risk outdoor play. Children being supported to be self-directed in decision-making and risk assessment.	Outdoor play in public playgrounds and a variety of outdoor play settings	The systematic review revealed overall positive effects of risky outdoor play on a variety of health indicators and behaviours, most commonly physical activity, but also social health and behaviours, injuries, and aggression.
Hallowell & Ratey (2011) *Driven to Distraction* Book focusing on a review of all recent research on physical activity and its impact on children with ADHD	USA: Studies focusing on children with ADHD medication and supplementary moving activity	Outlines physical activity firms up the brain -- making it a simple, alternative ADHD treatment.	Children engaging in physical activity outside of classroom to regulate moods	Moving the body concentration of mind focusing on body movement	"Exercise turns on the attention system, the so-called executive functions — sequencing, working memory, prioritizing, inhibiting, and sustaining attention,"
He et al. (2015) Effect of Time Spent Outdoors at School on the Development of Myopia Among Children in China Study: 2015 Empirical Multi-method	China: Preventative measures to support children's eye health	Randomized study of children to see the impact of outdoor activity on preventing near sightedness	Outdoor activities to reduce the impact of myopia	Primary school - six schools with children who were the average of 7 at the start of the study	Findings revealed that the children who spent more time outside reduced their risk of nearsightedness. Researchers believe that higher levels of light intensity outdoors may increase the chemical dopamine from the retina of the eye that can inhibit the growth typically seen in myopic conditions.

2.DEVELOPING SOCIAL, CONFIDENT AND CONNECTED PEOPLE WITH A DESIRED STUDENT OUTCOME: *A SOCIABLE CONFIDENT PERSON*

Research Study	Policy context	Purpose	Pedagogy	Place	Outcomes
Bortolotti: *Playing a new game with BOL: Bologna Outdoor Learning* Study: 2015 Empirical – quantitative research	Italy: city known for its cooperative, socio-political tradition High-quality kindergartens that have 'extensive outdoor space'	To develop / lead in-service teacher training for outdoor learning in KGs To monitor/evaluate results	Involves supporting adult KG leaders to increase range and quality of outdoor learning; no particular pedagogy discussed	Municipal KGs / trips	'Sense of well-being/ learning stimulation/ socialisation were evident' Impact of outdoor learning on child development
McCree: *Wild Wiltshire: Year 1 findings of a 3 year longitudinal evaluation of the impact upon disadvantaged primary-age children attending Forest School and OL* Study: 2014 Empirical - Multimethod	UK (England): project for children who 'struggle to thrive in a classroom setting; seen as likely to underachieve; economically and emotionally disadvantaged, with SEN'	Evaluation of the impact upon disadvantaged primary-age children attending Forest School and OL: changes to overall wellbeing and academic development; what factors enable this?; which changes are recognised by school? Significant changes over time?	Choice of activities; self-directed; self-expression; self-regulation. Making fires, dens, holes; tool use; films, art, stories; imaginative play	OL, Forest School, bushcraft, nature-based play, wild play, visits to nature reserves, regular visits to one woodland	Nurture, physicality, social time, hands-on and connecting with nature most popular experiences in Year 1 Assessment scales reveal deep level learning

3. STIMULATING SELF-REGULATED LEARNING WITH A DESIRED STUDENT OUTCOME: *A SELF-DIRECTED LEARNER*

Research Study	Policy context	Purpose	Pedagogy	Place	Outcomes
Beames: *Adventurous Learning* Study: 2014/2015 Theoretical	UK (Scotland): neoliberalism / market forces in education making it 'increasingly predictable, standardised and rationalised' but in Scotland, some support for OL through Curriculum for Excellence	To make learning more adventurous to equip students for 21st century living	Based on four features: Uncertainty Agency Authenticity Mastery. Creating 'appropriate contexts and methods for deep and meaningful learning'	Anywhere – not restricted to indoor or outdoor leaning	Not predictable; no 'one right answer' 'Elicits creative responses from students imagining solutions, refining ideas, putting them into practice'
Stevenson, Schilhab & Bentsen: *26 years of Attention Restoration Theory: clarifying how exposure to nature may improve high-order brain processes* Study: 2014/2015 Theoretical – Systematic literature review	Denmark: policy support in Education and Health departments	'to clarify the cognitive abilities found to be improved after exposure to nature'	'Exposure to nature' not defined	Nature	Exposure to nature has positive impact on executive function (cognition that coordinates several brain processes at the same time) and self-regulation abilities
Fuller: *Outdoor experiences and impact on education and self-confidence* Study: ND Empirical – qualitative and quantitative tracking data collection	UK (England): where there are high levels of educational inequality. Research took place in an area of very high deprivation.	To explore the educational attainment and aspirations of underachieving children from lower socio-economic groups perceived from outdoor adventure in residential settings activities	Adventure activities e.g. rock climbing, night forest walk	Residential centres	Students report higher confidence levels, 'significant' improvement in grades, improvement in relationships at home and with teachers

Loynes: Learning Away Study: 2015 Empirical – mixed methods	UK (England):Low attainment and engagement in schooling	To explore effects of residential camps - 61 schools nursery to secondary – on a range of beneficial outcomes for children struggling at school to support retention and attainment	Many diverse locally developed strategies: student co-construction and leadership; exchanges; transition camps; living history; camping; working with families; film making	Residential camps; school grounds	'One week worth a term'; findings include improved achievement, attainment, knowledge, skills, behaviour, transition experiences; raised aspirations; greater cohesion and sense of belonging; enhanced progression trajectories
Khan: *Examining the links between primary school landscape and children's motivation to learn* Study: 2014/2015 Empirical – quasi-experimental action research model in single primary school	Bangladesh: more than 26 per cent of children leave primary school before completion	To examine the extent to which a designed outdoor environment influence children's motivation towards learning and their willingness to come to school	School grounds re-designed in one school to facilitate OL; intervention group had OL and outdoor play; comparison group 1 same school and OP; comparison group 2 from another school, no OP/L	Renewed school grounds with natural learning area: flat surface; wet learning area; outdoor classroom; learning with 'loose parts'; growing area; shelter; pathway	Outside children (esp. 'underachievers')'feel better'; enjoy learning more; behave better; remember their learning; participate more willingly; engage with learning; increase attendance; talk to parents about learning
Lloyd: *Can place-based outdoor learning enrich the curriculum in Australian primary schools?* Study: 2015 Empirical - mixed method in a single primary school	Australia: curriculum learning enhancement	To explore what pedagogical approaches promote children's learning in PB outdoor learning and what children learn as a result of PBOL? To examine the extent to which explicit curriculum can be achieved in PBOL and how effective it is in fostering a sense of place and connection to nature	Constructivist learning theories. Experiential education, linking place and indigenous culture. Forming relationships with local places. Encouraging deep learning. Connecting to the local	School yard Waterworks Wet and dry environments	Children's increased engagement with learning; making connections; developing nature connectedness; wellbeing

4. SUPPORTING EFFECTIVE CONTRIBUTIONS AND COLLABORATION WITH A DESIRED STUDENT OUTCOME: *AN EFFECTIVE CONTRIBUTOR*

Research Study	Policy context	Purpose	Pedagogy	Place	Outcomes
Kerr: Science teaching for transition in the outdoor classroom Study: ND Empirical – mixed methods – CNI survey, online questionnaire child & qualitative teachers	Northern Ireland: Fewer science teachers; lack of teacher CPD; science not compulsory at GCSE; transition issues for students	To develop CPD for science teachers; additional focus on i) using science to support children moving to secondary school and ii) learning outdoors; to develop classroom materials to support science outdoors	Blended CPD / co-teaching with primary and post-primary teachers	Outdoors: in the school grounds	Greater environmental awareness; teamwork; children and teachers motivated and excited by learning science outside
Williams: Making research relevant: the impact of residential adventure education on English pupils aged 9-11 and the implications for policy and practice Study: ND Political and theoretical review – analysis of research studies	UK (England): the decline and rise of residential experience	To argue that OL is not a research-based profession and suggest three ways of helping the process: bridging researcher/ practitioner gap; increasing amount of practitioners that apply research findings; encouraging greater degree of practitioner-led action research	Not discussed	Not discussed	Impacts include learning about the self, relationships with teachers living and being with others but more quantitative research essential to convince headteachers and policy-makers of OL's value.

5. UNDERPINNING CARE AND ACTION FOR OTHERS AND THE ENVIRONMENT WITH A DESIRED STUDENT OUTCOME: *AN ACTIVE GLOBAL CITIZEN*

Research Study	Policy context	Purpose	Pedagogy	Place	Outcomes
Szczepanski & Andersson: *Perspectives on place: 15 professors' perceptions of the importance of place for learning and teaching outdoors* Study: 2015 Qualitative interviews - phenomenography	Sweden: cultural support for friluftsliv, widely embraced as learning method	To discover 15 professors' (different disciplines) perceptions on the importance of place for T&L outdoors in both school and non-school contexts studies how people experience a given phenomenon	Cross disciplinary agreement that OL can be used to develop physical reactions in response to different stimuli; personal relationship with landscape; knowledge of the familiar; wider understanding of society and environment	outdoor contexts in general	importance of 'the authentic place-related meeting, without intermediation, in the outdoor environment'
Gabrielsen: Learning in outdoor environments for sustainable development: a study of Norwegian practice Study: 2015 Empirical, qualitative, interviews and teachers reports	Norway: National Curriculum has 'the environmentally-aware human being' as part of the core curriculum. Part of the 'Sustainable Backpack' project	To understand teachers' rationales for the use of local learning arenas in ESD and their perceived barriers to teaching outdoors?	OL as authentic learning; to exemplify different ESD perspectives; high-quality learning environment;	Different chosen outdoor arenas	Affective impacts; Opportunities for (environmental)action
Nugent and MacQuarrie: *Reflections on water: evidence from nature kindergartens* Study: 2015 Empirical – qualitative research	International: Comparison of nature KGs in Scotland, Finland and Denmark	To discover the characteristics of each nature KG; case-study research	Fishing, den-building, berry-picking, cooking	Different outdoor settings – focus on water in the environment as a pedagogical tool	Connection with place; resilience; pro-nature / pro-environment attitudes
Burfield: *Connecting with nature: finding out how connected to nature the UK's children are* Study: Methodological – testing quantitative measures	UK: RSPB conservation policy within wider environmental policy	To review methodology of three different 'connectedness to nature' measures; to pilot and test all three measures; to recommend to the RSPB the most robust and appropriate measure for establishing national baseline / inclusion in future research	N/A	N/A	No existing measures found appropriate for 8-12 year olds. 5 questions developed and being tested in the Monitor of Engagement with the Natural Environment (MENE) survey. See also (www.rspb.org.uk/connectionmeasure)
O'Malley: *(Re) connecting children with nature? A sociological study of environmental education in Ireland* Study: ND Empirical – qualitative	Ireland: curriculum, outdoor play and the environment	To examine the development of primary level environmental education in Ireland, and how (in)effective it is in connecting children with the NE; through policy analysis and the diverse experiences of EE practitioners and learners	The decline of unstructured, experiential outdoor play and rise of curricular teacher-led pedagogical approaches	None specified	Transformative impact of EE 'severely constrained by its close links to mainstream education'

6. COMBINATION OF ALL FIVE THEMES

Research Study	Policy context	Purpose	Pedagogy	Place	Outcomes
Blackwell & Passy: *School-based learning in natural environments: lessons for policy and research from the NCDP* Study: 2013-2015 Empirical – mixed methods 125 schools	UK (England): White Paper on Natural Environment that pledged to 'remove barriers to learning outdoors and increase schools' abilities to teach outdoors when they wish to do so'	Evaluation of project to yield recommendations for policy and practice	Various but centred on learning curricular subjects outdoors	Local green space in school grounds or within walking distance of the school	Teachers report that pupil attainment, learning engagement, behaviour, health and wellbeing and social skills are improved by learning outside
Mygind: *Approaching Danish school children's view on udeskole: a mixed methods study* Study: ND Empirical – mixed methods	Denmark: Ministry of Education support for spread of learning outside the classroom (udeskole)	To explore Danish children's experience of udeskole.	Udeskole is teaching curriculum subjects in contexts outside the classroom	Varied; Natural environments and museums, business etc.	Children are positive towards udeskole; no clear indication that younger children like it more than older; boys are generally more positive; boys gain more academic benefits
Ho: *Outdoor learning in Singapore: past, present and future* Study: ND Empirical – policy and literature reviews	Singapore: Policy aims for student outcomes are to be a confident person, a self-directed learner, an active contributor and a concerned citizen.	To show historical development of OE policy in Singapore; curriculum change in 2014 introduced first formal OE in PE syllabus; empirical research into teachers' perceptions and experiences of OE	PE teachers conceptualised OE as camp-based format / adventure-focused activities; acquisition of technical and everyday life skills; development of 21st century lifelong and life-wide dispositions and skills	Outdoor adventure learning centres; expeditions; field trips; learning journeys	Research demonstrates need for CPD for PE teachers; to broaden perspectives of OL; for more research to investigate processes of OE experiences to inform practice
Barford & Bentsen: *Why (and how) Denmark is investing in outdoor learning: from bottom-up to top-down* Study: ND Theoretical – longitudinal policy/ project review	Denmark: recent Education policy changes to the curriculum involve longer school days with more physical activity; and link with development of Teachout research project and udeskole development project	To illustrate the change of udeskole as a 'bottom-up' movement into one encouraged by new curriculum requirements and government funding	Different kinds of pedagogy determined by teachers with autonomy of practice	Built and natural environments	Growing importance and incidence of udeskole in Denmark