

EXECUTIVE SUMMARY

Time spent learning in the outdoors has decreased dramatically for children in Scotland in recent years, despite educational policy encouraging outdoor and experiential learning. Research evidence from Scotland and internationally suggests that School Gardens are a powerful educational resource for learners, teachers, schools, and wider communities, that bring a range of benefits for academic achievement, health and wellbeing, and increasing environmental awareness.

Educational and Academic Benefits

- Studies across international contexts have demonstrated the direct and positive impacts of school gardens on academic achievement in a range of subjects including science, maths, and languages, with the potential to address gaps in learning.
- Engaging in problem solving and critical thinking activities in the garden, in a different and more informal learning environment to the classroom, gives children the confidence to make mistakes, learn from them, and find solutions.
- A range of studies have demonstrated the benefits of experiential learning in school gardens for developing confidence and academic abilities in children and young people.
- Involving parents, carers, volunteers, and local organisations in the creating, tending, and maintaining of the gardens fosters intergenerational learning and a sense of community investment and ownership of spaces.

Health and Wellbeing

- Directly involving children in planting, cultivating, and harvesting fresh fruits, vegetables, and herbs in the school garden can enhance their knowledge and appreciation for nutritious foods.
- Experiences in the garden can positively influence schoolchildren's dietary behaviours, and reduce the consumption of processed and unhealthy foods, therefore potentially preventing mid- and long-term chronic health conditions such as obesity and diabetes.
- Activities in school gardens can provide important opportunities for children and young people to exercise in the outdoors and can contribute to social and emotional wellbeing.
- Studies have shown that involvement in school gardens can reduce feelings of stress, anger, and inattention, and promote resilience and restorative strategies.

Sustainability and Environmental Behaviours

- Research has found that learning and interacting in the gardens helps young people to develop more respectful attitudes to the environment, and creates opportunities for schools to partner with third sector organisations that support sustainable food practices.

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- Through hands-on activities in the school gardens, children gain an understanding of biodiversity and ecological systems, promoting environmental stewardship and encouraging sustainable practices in their everyday lives.
- Gardening activities can also offer a platform for children to exercise their rights with regards to environmental problems and become involved in the sustainable development of their communities.
- Food growing in the gardens can also serve as sources of fresh produce for school meals or local food banks, promoting food security within the community.

Recommendations

Funding and Research: Dedicate funding to enable schools to set up and maintain school gardens, and to support further UK-based research into integrating garden learning across curriculum areas.

Curriculum: Encourage the integration of school garden activities across different curriculum areas to take advantage of learning and wellbeing gains.

Policy and Planning: Emphasise the potentialities of garden learning in policy initiatives and for school improvement plans, to raise awareness of the benefits to schools, teachers, and learners.

Initial Teacher Education and Career Long Professional Learning: Incorporate information on school gardens across ITE programmes and CLPL in Scotland and provide opportunities for student teachers and teachers to engage directly in garden learning activities and pedagogies, for example through initiatives such as the [One Seed Forward Garden Schools Programme](#).

Sustainable Partnerships: Promote and facilitate community and third sector partnerships with schools that can assist with the creation and maintenance of school gardens and support intergenerational and community learning.

Ecology and Biodiversity: Forge closer links between Learning for Sustainability targets and initiatives and the potential of school gardens to raise awareness of, learn about, and promote ecological practices.

This policy has been further supported and endorsed by the Schools of Education in the University of West of Scotland and Strathclyde University and the Education Division of Queen Margaret University.



FULL BRIEFING

INTRODUCTION

Time spent learning in the outdoors has decreased dramatically for primary school children in Scotland in recent years, with unequal access particularly evident in areas of higher socio-economic deprivation (Mannion et al., 2023). Despite educational policy and the Curriculum for Excellence encouraging outdoor and experiential learning (Education Scotland, 2022), children's opportunities to engage in and through nature is decreasing, with a growing number of children suffering from what has been termed 'Nature Deficit Disorder' (Bento and Dias, 2017).

Research evidence from Scotland and internationally suggests that School Gardens are a powerful educational resource for learners, teachers, schools, and wider communities. This policy briefing serves to highlight the value and impact of school gardens for improving learning, achievement, health and wellbeing, and attitudes towards environmental sustainability, in line with key Scottish Government priorities such as the [Scottish Attainment Challenge](#) (Scottish Government, 2022, 2021; Hancock et al., 2023) and the [Learning for Sustainability Action Plan 2023-2030](#) (Scottish Government, 2023). [The Muir Report](#) in 2022 cited outdoor learning, climate change, children's rights, and social justice as key drivers of education, and advised placing learners at the centre of the education system (Scottish Government, 2022b), and the LfS Action plan highlights the importance of sustainable school grounds; research indicates that school gardens can contribute towards realising these aims for Scotland's children and young people.

We focus on **three key themes** regarding the benefits of school gardens:

1. Educational and Academic Benefits
2. Health and Wellbeing
3. Sustainability and Environmental Behaviours

RESEARCH EVIDENCE

THEME 1: EDUCATIONAL AND ACADEMIC BENEFITS

School gardens provide opportunities for children and young people to learn about a range of subjects, themes, and issues, and with a variety of different people, with positive impacts on academic achievement.

Academic Achievement and STEAM* Skills

Studies have shown that learning experiences in school gardens can impact positively on and improve children and young people's academic achievement. For example, research in the Washington, DC, area has found that school gardens have the potential to address gaps in learning. Analysis of mathematics, reading, and science standardised test scores demonstrated that learners at garden-based schools performed academically better than their peers. Furthermore, the research demonstrated that school gardens can be employed as a policy tool to address inequalities and establish environmental equity across low-income urban areas (Ray et al., 2016).

**STEAM Education is an approach to learning that incorporates Science, Technology, Engineering, the Arts, and Mathematics.*

This is one of several studies to link garden-based learning with improved educational outcomes; syntheses of literature on school gardens across international contexts have demonstrated direct and positive impacts on academic achievement in subjects including science, maths, and language arts (Williams and Dixon, 2013; Monferrer et al., 2022; Moore et al., 2012). Longitudinal research involving 63 low-performance secondary school children in Spain found that involvement in garden-based learning significantly reduced dropout rates and disruptive behaviour, and improved skills, confidence, and attitudes to learning.

Evidence also shows that focusing on science learning in school gardens in low-income areas promotes student engagement and motivation for learning, and impacts positively on achievement (Williams et al., 2018). There are many links between learning in the gardens and notable improvements in STEAM subjects (Science, Technology, Engineering, Arts, and Mathematics). Research in Scotland has shown that 'STEAM Gardens' offer a new form of educational innovation which promotes modes of learning that are cognitive, sensorial, and experiential (Gray et al., 2021). Furthermore, school garden spaces can create opportunities for cross-curricular learning, as well as lessons focusing on nature, biodiversity, and ecology in an authentic and vibrant environment (Fisher-Maltese, 2013); in a sense, bringing learning to life.

Critical Thinking and Problem-Solving

Learning in school gardens can also develop a wide range of skills related to problem-solving and critical thinking, through allowing children to engage actively in their learning. For example, planning and measuring the garden space, and working out the distances needed between plants for them to grow successfully (Viola, 2006). Research has found that engaging in problem solving activities in the garden, in a different and more informal learning environment to the classroom, gives children the confidence to make mistakes, learn from them, and find solutions (Colucci-Gray et al., 2021). It can also create opportunities for critical thinking and understanding of issues related to food production and consumption (Lakin and Littledyke, 2008), and for developing knowledge about nutrition and healthy eating (Holloway et al., 2023) [*See Theme 2 for further evidence regarding links to health and wellbeing*].

Experiential and Intergenerational Learning

The hands-on nature of learning in the gardens allows children to connect theoretical knowledge with practical applications, and to actively engage in their learning. A three-year longitudinal study involving 67 schools in England, Kenya, and India, found that gardens offered vital opportunities for experiential learning, which fed into other aspects of the curriculum, and had a positive impact on children's self-esteem and attitudes to school (Bowker and Tearle, 2007). A range of other studies have demonstrated the benefits of experiential learning in school gardens for developing confidence and academic abilities in children and young people (Holloway et al., 2023; Ruiz-Gallardo et al., 2013).

School gardens can also act as a hub for wider community engagement and partnerships, facilitating intergenerational learning. Involving parents, carers, volunteers, and local organisations in the creating, tending, and maintaining of the gardens fosters a sense of community investment and ownership of the spaces (Cutter-Mackenzie, 2009; Fisher-Maltese, 2013). Research from Scotland has also shown that teachers value the opportunity to take on the role of learner, creating space for children to take the lead in different aspects of the garden learning (Hancock et al., 2023).

However, it should be noted that schools and teachers face certain challenges in sustaining gardens as spaces for learning, including a lack of resource, support, and recognition in policy and curricula (Earl and Thomson, 2020). Studies have shown that for school gardens to be effective in their learning intentions, strong leadership from school management is vital (Lakin and Littleddyke, 2008).

THEME 2: HEALTH AND WELLBEING

Engaging children and young people in school gardens can promote a range of health and wellbeing benefits, including impacting on eating habits and dietary behaviours, developing knowledge about nutrition, and promoting physical and mental health. This is particularly important given current concerns around children and young people's health and mental wellbeing throughout the UK (Scottish Government 2018, 2019; NHS England, 2018; Neagle et al., 2018).

Healthy Eating and Nutrition

Research on school gardens has shown that they have the potential to improve overall nutrition and promote healthy eating habits. Directly involving children in planting, cultivating, and harvesting fresh fruits, vegetables, and herbs can enhance their knowledge and appreciation for nutritious foods. A study at four primary schools in Belgium found that involvement in school gardens had positive effects on children's knowledge of and attitudes towards vegetables (Huys et al., 2017). Furthermore, Ohly et al.'s (2016) review of literature found evidence from several studies suggesting that growing food in school gardens can encourage schoolchildren to eat more fruit and vegetables, and thereby improve nutritional habits (Nanney et al., 2006). Results from a three-year longitudinal study at eight schools in America focusing on a school-based gardening, cooking, and nutrition programme determined that dietary intake and behaviours were improved significantly (Landry et al., 2021). There is therefore a range of research evidence demonstrating that experiences in the garden can positively influence schoolchildren's dietary choices (Holloway et al., 2023; Benkowitz et al., 2019), and reduce the consumption of processed and unhealthy foods, thus potentially preventing mid- and long-term chronic health conditions such as obesity and diabetes. Given that dietary consumption habits are established in childhood, garden programmes can act as an intervention where messages around nutrition education are reinforced (Turner et al., 2016).

Physical and Mental Health

It has been recognised that activities in school gardens can provide important opportunities for children to exercise in the outdoors (Dillon et al., 2006), with the potential to impact positively on exercise habits (Hermann et al., 2006). Several studies have demonstrated that schools, teachers, and parents valued school gardens as a means through which children and young people could become more physically active (Ohly et al., 2016). For example, research focusing on a school garden intervention at 12 elementary schools in New York found that children's sedentary activity decreased, and that they spent more time engaging in physical activity in the gardens than they would have in indoor, classroom-based lessons (Wells et al., 2014). A report from the National Foundation for Educational Research (NFER) in the UK found that school gardening developed physical skills, including fine motor skills, through transplanting of seeds and other activities (Passy et al., 2010).

There are also reported mental health benefits for children and young people engaging in school gardens. Studies have shown children describing the gardens as ‘relaxing’ or ‘peaceful’ spaces (Ohly et al., 2016). Chawla et al.’s (2014) inquiry into a gardening programme for US high school students found that involvement in the gardens reduced feelings of stress, anger, and inattention, including for young people with Attention Deficit Hyperactive Disorder (ADHD) and depression, and promoted resilience, stress management, and restorative strategies. Building and reinforcing confidence, self-esteem, and developing a sense of achievement through gardening activities also has the potential to impact positively on children’s mental health (Block et al., 2012). There is also some evidence that involving parents and the wider community in school gardens can provide opportunities for improving the mental health and wellbeing of adults (Hancock et al., 2023).

Social and Emotional Health

Linked to positive impacts on mental health, school gardens have also been shown to contribute to the social and emotional wellbeing of children and young people. Working collaboratively in a garden setting can foster a sense of community, empathy, and respect for others. School gardens offer opportunities for children and young people to develop teamwork and interpersonal skills, which helps to advance social and emotional growth (Holloway et al., 2023; Block et al., 2012; Passy et al., 2010). Cutter-Mackenzie’s (2009) study found that multicultural school gardens fostered a strong sense of belonging in refugee and migrant children, creating opportunities to learn English, and connect to other young people and the local environment and community. Other recent research has demonstrated the capacity of school gardens to develop a sense of belonging, through grounded and experiential activities which draw children closer to their environment and the ‘more than human’ world (Gray et al., 2021). The responsibility of caring for living organisms instils a sense of purpose, accomplishment, and ownership among students. Research in Scotland has demonstrated how growing and caring for plants and vegetables in school gardens allowed children to learn how to be nurturing towards their environment, their peers, and themselves (Hancock et al., 2023; Colucci-Gray et al., 2021; Gray et al., 2019).

THEME 3: SUSTAINABILITY AND ENVIRONMENTAL BEHAVIOURS

School gardens can also become spaces where children and young people develop positive attitudes towards the environment, engage with issues of biodiversity and food security, and learn how to live sustainably.

Attitudes to the Environment

Introducing gardens in school grounds provides possibilities for children to both learn more about their environment and to forge closer connections to the natural world. Studies have found that learning and interacting in the gardens helped young people to develop more respectful attitudes to the environment (Monferrer et al., 2022). This greater awareness can focus on the local and immediate environment of the school garden, for instance in terms of the changing of the seasons, and wildlife and insects (Ohly et al., 2016), and may also encompass consideration of wider and global issues of biodiversity and sustainability, for instance in terms of food supply, recycling, and environmental protection (Cutter-Mackenzie, 2009; Lakin and Littledyke, 2008).

There is also evidence that by engaging in and through school gardens children can come to understand humans and the environment as interconnected, rather than separate (Hipkiss et al., 2020). Furthermore, school gardens offer the opportunity to partner with third sector and non-profit organisations that support sustainable food practices (Turner et al., 2016). Fisher-Maltese's (2013) study of 71 children taking part in garden-based science curriculum found that not only did experiences in the garden lead to improvements in environmental attitudes, but that they also fostered more empathetic views of nature, which led to children becoming 'environmental stewards' and interested in protecting insects from pesticide use and habitat loss.

Sustainable Living

Greater understanding and awareness of, and respect for, environmental issues can act as a jumping off point for introducing children to sustainable practices, in the school and in the wider community (Benkowitz et al., 2019; Moore et al., 2015). In addition to providing opportunities to discuss pressing environmental issues, such as climate change and food security, school gardens can offer platforms for children and young people to look at ways to address them. For example, the gardens serve as living laboratories where children and young people can learn about sustainable agricultural practices, composting, water conservation, and biodiversity. Through hands-on activities, children gain an understanding of ecological systems, promoting environmental stewardship and encouraging sustainable practices in their everyday lives (Fisher-Maltese, 2016). A study at six primary schools in Scotland found that teachers used school gardens as the impetus to engage with issues of sustainability and actively explore with children how to make schools more environmentally friendly, for example by making their own compost (Hancock et al., 2023).

Food Activism and Food Security

Gardening at schools also allows learners and the wider community to engage in issues related to food activism and food security (Earl and Thomson, 2020; Gough et al., 2020). Food security is defined as people having access to safe, sufficient, and nutritious food at all times (Holloway et al., 2023), while food activism is when communities are empowered to make decisions, changes, and speak out about food consumption, production, and distribution (Counihan & Siniscalchi, 2014). A study at a school garden in Nova Scotia, Canada, found that school gardens develop values in children and adults that support community food security (Carlsson et al., 2016). Research investigating gardens at four schools in Portugal found that gardening activities can offer a platform for children to exercise their rights with regards to environmental problems and become involved in the sustainable development of their communities; though it also found that more could be done by schools to empower children and young people to take action in this way (Rios and Menezes, 2017). School gardens also promote community involvement, which strengthens relationships between schools and their surrounding neighbourhoods, fostering a sense of ownership and pride. Food growing in the gardens can also serve as sources of fresh produce for school meals or local food banks, promoting food security within the community (Block et al., 2012). In such ways school gardens can not only transform the environment of the school, but also reach out to and connect with the local community, creating meaningful partnerships and structures that strive for greater equality locally and in wider society.

RECOMMENDATIONS

Funding and Research: Dedicate funding to enable schools to set up and maintain school gardens, and to support further UK-based research into integrating garden learning across curriculum areas.

Curriculum: Encourage the integration of school garden activities across different curriculum areas to take advantage of learning and wellbeing gains.

Policy and Planning: Emphasise the potentialities of garden learning in policy initiatives and for school improvement plans, to raise awareness of the benefits to schools, teachers, and learners.

Initial Teacher Education and Career Long Professional Learning: Incorporate information on school gardens across ITE programmes and CLPL in Scotland and provide opportunities for student teachers and teachers to engage directly in garden learning activities and pedagogies, for example through initiatives such as the [One Seed Forward Garden Schools Programme](#).

Sustainable Partnerships: Promote and facilitate community and third sector partnerships with schools that can assist with the creation and maintenance of school gardens and support intergenerational and community learning.

Ecology and Biodiversity: Forge closer links between Learning for Sustainability targets and initiatives and the potential of school gardens to raise awareness of, learn about, and promote ecological practices.

Useful Resources

One Seed Forward is a community growing initiative partnering with schools across Scotland and the UK, with over 20 schools gaining recognition with OSF Garden School and Climate Action awards.

The One Seed Forward Garden Schools Programme consists of 8 modules with activities, videos, and resource links for creating and establishing gardens at schools, including tips on germination, planting, growing, tending, and harvesting, as well as facts and information behind the gardening. The activities are entirely flexible and allow for working in different contexts and with a range of age groups.

[You can access the programme here.](#)

One Seed Forward, in partnership with the School of Education at University of Aberdeen, has also developed a **free training resource for teachers** interested in establishing gardens for growing food in schools. [The training resource can be accessed here.](#)

The Scottish Universities Insight Institute (SUII) funded a programme of research and development on [Food Activism in the Schoolyard](#), led by University of Edinburgh and University of Strathclyde. The programme developed two frameworks for enabling practitioners in schools to engage with food as a central dimension in the lives of all young people, and as a key topic of Learning for Sustainability. Both frameworks can be found below.

Learning for Sustainability Framework: <https://bit.ly/3gL0to9>

Food Activism Framework: <https://bit.ly/3jzoDDX>

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