# Growing Wild Citizens @school:
## Healthy eating with the planet in mind

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## Abstract

Responding to policy calls in England for whole-school approaches to food education and environmental sustainability, we report on the 'Growing Wild Citizens @school' programme, which aimed to support primary school children in the understanding of healthy eating and sustainable food systems through biodiversity enhancement activities in school grounds. Using a qualitative approach with two urban primary schools over one growing season, children engaged in food growing, habitat enhancement and reflection activities. Findings from group interviews show development of interdisciplinary food systems knowledge, including understanding of food miles and food security, children's social and environmental responsibility and action competence dimensions. School grounds emerged as meaningful sites for supporting children as active environmental citizens. This study shows that young children can act as agents of change within their local settings; thus, as educators, we should maximise opportunities for them to shape and influence their communities at present and not solely as future citizens.



## Keywords

Biodiversity enhancement, healthy eating, food systems, environmental and sustainability education, action competence

## Introduction

We are currently experiencing many environmental and social challenges, which impact our daily lives. One key challenge is the sustainable and healthy production and consumption of food, and the environmental implications of these processes (Mensah, Wieck & Rudloff, 2023; Poppy & Baverstock, 2019), including the use of land for food production, which is discussed as a key driver for biodiversity loss (United Nations, 2023). In England, policies aiming to address these challenges include the National Food Strategy's recommendation that the Department for Education (DfE) introduce an 'Eat and Learn' initiative (Dimbleby, 2021), whereby a whole-school approach to learning about food should be encouraged to promote healthy lifestyles and a better understanding of our food system. The food system refers to all activities involved in producing, processing, transporting, consuming and disposing of food; the health of food systems affects our health, environment, economies and cultures (Geneva Environment Network, 2025). Further, the Government's Sustainability Education policy (DfE, 2022) now requires all education settings to have in place climate action plans to ensure that sustainability is addressed across the curriculum and school estates. Understanding complex and often controversial socio-scientific issues (SSIs), such as sustainable food consumption and biodiversity loss, require interdisciplinary approaches to science and environmental education (Greer, Walshe, Kitson & Dillon, 2024; Ratcliffe & Grace, 2003; Siraj-Blatchford, 2023). This does not only focus on disciplinary knowledge; it also aims to develop environmental consciousness (Markwick, 2023), healthy and sustainable eating habits and food literacy (Ares *et al,* 2023), environmental citizenship (Christodoulou & Grace, 2024) and action competence for sustainability (Sass *et al,* 2020).

## Healthy eating with the planet in mind

Healthy eating with the planet in mind requires knowing about and implementing sustainable eating practices that minimise impacts on the environment, such as the energy required to produce, transport and prepare food, and the waste created from these processes (Baroni, Filippin & Goggi, 2018). Action-oriented science and environmental education aims to develop action competence for dealing with sustainability issues (Sinakou *et al,* 2019). This includes developing children's *knowledge of actions* to address an issue, having *confidence* in their action-taking skills and in their ability to effect positive changes to their local environments and to have *willingness and passion* for taking action (Sass *et al,* 2020).

An example of an action-oriented approach in England is the *Wild Citizens* programme (Christodoulou & Grace, 2024). *Wild Citizens* supported primary school children to become active environmental citizens by utilising school grounds as spaces for learning (Austin, 2022; Malone & Tranter, 2003). Children explored their school grounds, devised action plans for enhancing biodiversity, implemented and evaluated their action plans and communicated to others the importance of their actions. The local context in which actions were implemented, and opportunities to observe the impact of their actions in their surrounding natural environment, supported children's confidence in their ability to effect change, and their knowledge of pro-environmental actions at school and at home (Christodoulou & Grace, 2024).

Other school garden programmes such as the *Gardens for Bellies* programme in Denmark, which combines learning about nature with healthy eating, have been found to positively affect children's wellbeing and self-esteem (Dyg & Wistoft, 2018) and expand their experiences of tasting food (Nielsen, Dyg & Wistoft, 2020).

The main aim of the work presented in this article is to explore how we can engage children with both *'learning about and improving biodiversity'* and making *'sustainable food choices'*, as required by the current Sustainability Education policy (DfE, 2022), by utilising and maximising the affordances offered by school grounds for learning (Austin, 2022) and embedding knowledge about food systems and food security in biodiversity-focused activities. Our research question is: *How do children perceive their involvement in the 'Growing Wild Citizens @school' programme?*

The following sections present our approach and insights from children's experiences of taking part in this programme to answer the research question.

## Methodology and participants

We took a qualitative, participatory approach (Montreuil *et al*, 2021), working with two primary schools to co-create and implement with teachers and children a series of activities to support engagement and understanding of how food grows, where it comes from, and how growing food can impact the environment. We collaborated with the teachers in each school to ensure that activities had clear curriculum links, particularly in science and Personal, Social, Health and Economic education (PSHE). We involved children in decisions about how to proceed with actions such as planting and taking care of food plants, and activities to enhance biodiversity. Both state-funded schools were in urban settings, had been involved in *Wild Citizens* previously, and were diverse in terms of their school grounds size, programme implementation, and demographics.

School A was a primary school with 36% of pupils eligible for pupil premium funding and with approximately a third of pupils whose first language was not English. We worked with a class of about 30 Year 5 (ages 9-10) children and their teacher, with sessions held within school curriculum time. Each classroom had an allocated outdoor, but mostly overgrown, flower bed and some neglected raised beds. The beds were near a single but limited water source (with no water butts). The school had a woodland area and willow dome as an external classroom, which was developed as part of the *Wild Citizens* project in the previous school year.

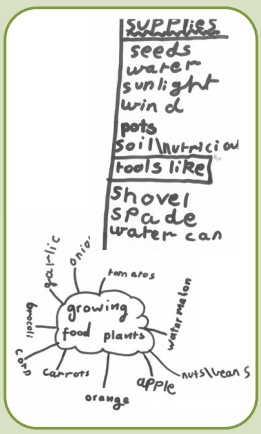
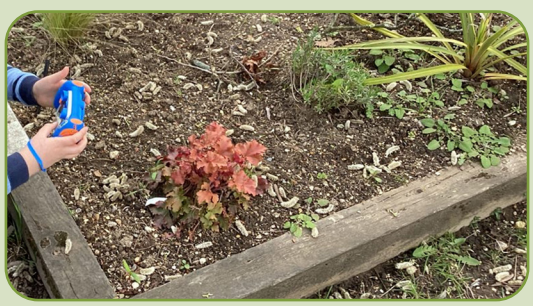
**"We involved children in decisions about how to proceed with actions such as planting and taking care of food plants, and activities to enhance biodiversity."**

School B was in a residential area and had recently joined a multi-academy trust. Approximately 29% of pupils at the school were eligible for pupil premium funding and, for 9% of pupils, English was not a first language. We worked with a class of about 30 Year 3 (ages 7-8) children and their teacher, who was the school's Science Subject Lead. In this school, an after-school club approach was adopted with most of the Year 3 class volunteering to be part of the club. The large school grounds had a mostly overgrown existing garden with raised beds, and a plastic greenhouse that had not been used for vegetable growing previously. There was no nearby source of water (including working water butts) as can be typical within school settings. An additional challenge at the time was that the school was being renovated, and this had to be considered when planning and carrying out activities.

To explore children's perceptions and experiences of taking part, we used semi-structured group interviews (Christodoulou & Grace, 2024) at the start of the growing season in the school grounds (some activities involving growing seeds indoors had taken place already; Round 1) and at the end of the project (Round 2 interviews). In each school, we interviewed the same three groups of four children in each, resulting in 6 group interviews per school, to gain insight into how they viewed their participation in the project, and how they articulated the importance of growing food for sustainability. We also kept notes from each session and took photos of the children's work.

Each school ran weekly sessions from February to mid-July (approximately 18 sessions), which were co-led by teachers, the authors, and another University of Southampton student intern. Table 1 presents the steps and activities conducted over time. The steps taken were the same, with activities adjusted for each year group.

▼ **Table 1** Overview of the *Growing Wild Citizens @school* programme.

| Steps (represent several sessions) | Activities | Pictures from children's work and actions |
|---|---|---|
| Step 1: Exploring the school grounds | ▲ Taking pictures of existing school grounds and establishing what is there already (plants and wildlife).<br>▲ Drawing ideal school grounds with wildlife they would like to see.<br>▲ Making a list of the food they would like to grow and eat and asking their family about food growing. |   |
| Step 2: Planning growing food and wildlife interventions | ▲ Learning about conditions needed for plant growth.<br>▲ Learning about seeds and starting to grow plants indoors using seed trays (e.g. coriander, beetroot, wild rocket, radishes, sugar snap peas) in preparation for planting outdoors.<br>▲ Monitoring plant growth indoors and taking planted pea pots home, to look after over February half-term.<br>▲ Preparing the ground (raised beds) to create a suitable environment for plants to grow at school. |   |

| Steps (represent several sessions) | Activities | Pictures from children's work and actions |
|---|---|---|
| Step 3: Growing outdoors – implementing interventions | ▲ Reviewing school grounds and deciding where to place food plants.<br>▲ Sowing seed and seed potatoes outdoors using pots and raised beds.<br>▲ Planning to grow food that is easy to cook or needs no cooking.<br>▲ Devising a sustainable care plan for plants (pollinators and composting).<br>▲ Learning about waste and composting. Installing compost bins and starting the composting process.<br>▲ Monitoring plant growth.<br>▲ Learning about watering plants and the environment. |   |
| Step 4: The food we eat and where it comes from | ▲ Learning about where our food comes from using: https://resourcetrade.earth/ (Poppy, Baverstock & Baverstock-Poppy, 2019) as a research tool.<br>▲ Thinking about how people work with plants. | **We grow a lot of fruit and vegetables in the UK, but some come from overseas countries.**<br>Class discussion in groups – what country do these fruits and vegetables come from?<br>Peppers – Spain<br>Carrots – South Africa<br>Broccoli – Spain<br>Thyme – Kenya<br>Oranges – Italy<br>Bananas – Ghana<br>Mushrooms – UK<br>Apples – UK<br>Avocados – Columbia<br>Onions – UK (all)<br>Chicory – UK<br>Potatoes – UK<br>Lemons – Spain<br>Limes –Spain<br>Pears – UK<br>Tomatoes – Spain<br>Fennel – Spain<br>Parsnips – UK<br>  |

| Steps (represent several sessions) | Activities | Pictures from children's work and actions |
|---|---|---|
| Step 5: Birds and other animals – Planning and implementing interventions | ▲ Reviewing school grounds for best locations to place bird feeders, insect hotels, planting wild flowers and implementing interventions.<br>▲ Learning about attracting pollinators, companion planting and other safe methods for dealing with animals that eat vegetables. |   |
| Step 6: Monitoring food plants and wildlife interventions | ▲ Monitoring growing areas and investigating evidence of pollination (fruits).<br>▲ Continuing watering and caring for plants.<br>▲ Taking pictures as evidence of growth.<br>▲ Discussing what has changed, and evidence for it. |   |
| Step 7: Evaluate interventions and communicate to audiences (e.g. celebration event, parents, teachers) | ▲ Tasting the vegetables grown.<br>▲ Taking photos of school grounds and the food grown for evaluation purposes.<br>▲ Discussing and reflecting on actions taken and how this is making a difference to the school grounds and the environment.<br>▲ Preparing posters to explain actions and the importance of growing food sustainably.<br>▲ Presenting their work at a celebration event at the University of Southampton. |   |

## Insights from children on growing food sustainably, with the planet in mind

To answer our research question, we analysed the interview transcripts thematically (Braun & Clarke, 2006), identifying three key themes in how children perceived their participation in the *Growing Wild Citizens @school* programme: (a) children perceived the activities as important, drawing on scientific knowledge, including food systems knowledge to justify their ideas; (b) children perceived their involvement as contributing to both social and environmental citizenship; and (c) children discussed how they feel that they are making a difference, drawing on their actions as evidence to justify their confidence in making a difference. These themes are discussed in detail next.

### The importance of growing food sustainably

In discussing the importance of growing their own food, children were able to articulate key food systems knowledge related to *food security* (having sufficient safe food to feed all the people all the time) and *food miles* (the distance that food travels from production to consumption). Children from both schools drew on several different justifications to discuss the importance of growing their own food, including: health and nutrition, costs, pollution, and seasonality; these themes were explored during the programme (Table 1) and correspond to the interdisciplinary nature of sustainability issues that require different types of knowledge to be considered (Markwick, 2023). Knowledge of food systems was raised when children were asked to justify why growing food might be good for the environment. Children acknowledged the link between imported food and the carbon footprint impact that this has. One group noted that growing their own food *'is cheaper and it is better for the environment because when they import foods from other countries, like sometimes let's say bananas, which we can't grow here, they use big ships which let out lots of fossil fuels'* (Round 1, School A, Group 2).

**"Knowledge of food systems was raised when children were asked to justify why growing food might be good for the environment. Children acknowledged the link between imported food and the carbon footprint impact that this has."**

Children's participation in the project helped them to understand food systems and issues around food security, making them realise the effort that is required to have fruit and vegetables readily available. One group at the end of the project acknowledged this by noting: *'In the end what was most important we learnt probably was how the stuff we eat from Sainsbury's and Tesco's come to be and we felt what it was like to try everything that you grow... I think if we didn't learn that then we wouldn't, so now I see a packet of strawberries and think "how long did it take to grow all those strawberries?"'* (Round 2, School A, Group 3).

## Being active citizens: Social and environmental responsibility

Children during both interview rounds and in both schools articulated their role as active, responsible citizens of their communities. Environmental responsibility as a citizenship dimension (Christodoulou & Grace, 2024) was identified when children discussed their role in helping the environment by implementing actions such as planting flowers and helping plants to grow. Children drew on scientific knowledge in discussing the importance of protecting the environment mainly in relation to the central role that trees and plants have in providing oxygen, and how that supports life.

The social responsibility dimension of citizenship was discussed by children in relation to how growing their own food could benefit not only themselves but also others, especially those in need. Children noted the importance of *'making sure that everyone can have food and it is not just about yourself'* (Round 1, School B, Group 2).

**"The social responsibility dimension of citizenship was discussed by children in relation to how growing their own food could benefit not only themselves but also others, especially those in need."**

They also refer to their families as the immediate group of people whom they can influence positively, for example, *'[I] want my family to have fresh fruit and also, I'm kind of encouraging my family to grow, start growing their own food'* (Round 1, School A, Group 2). Children also interrelated the importance of supporting others in their communities with the importance of protecting the environment, articulating both social and environmental responsibility as encapsulated in the following quote, in response to being asked at the end of the project why it is important to grow our own food: *'it's helping us learn more about the planet and about how we can help grow more food'* (Round 2, School B, Group 2).

## Developing action competence – learning how to make a difference

When discussing the perceived impact of their work, children refer to their potential or implemented actions, what they have learned about growing their own food and how this might influence others (a type of indirect action). For instance, during the first round of interviews, when asked if they are making a difference, a child said: *'Yes, I am. There will be more trees, and everyone can be more healthy…because in England loads of people can eat junk food and we need to show them they need to be healthier'* (Round 1, School B, Group 2). Others commented that *'when I walk into town, I see lots of poor people there. So, I'm thinking that we could set up a stall with all the things [we grow] in there and poor people could just come up and take the things…'* (Round 1, School B, Group 2).

Such responses indicate that children already had the willingness and passion for taking socially responsible and pro-environmental actions; we should therefore make the most of these feelings of empowerment. They also show how children can use disciplinary knowledge, contextualising it within the work they carried out.

This perception of their work as impactful, both societally and environmentally, was strengthened by the end of the project, as children were now able to refer to their implemented actions (e.g. growing their own food) as evidence to justify their confidence in making a difference in a realistic way. For instance, one group in School A pointed out that: *'We learnt that in the end we might not have enough food to feed everyone but we still made a difference by feeding some people because we did eat our food and it made a difference to us because if we didn't do that then we wouldn't have… like the feeling of like…our own food and our hard work and labour. But also, we learnt lots of stuff about plants and how to grow them and we learned the best environments [for growing food]'* (Round 2, School A, Group 3).

Children's confidence in their own abilities to effect change was also evident in their mention of how they were now able to influence others in their school to act in similar ways: *'We are encouraging other children and the children's parents to grow more at home because we have been very successful at what we have done and helping them to get more…to make the world, make it much more better' (Round 2, School A, Group 1).*

## Implications for practice and conclusion

When it comes to teaching and learning about climate change and sustainability, a knowledge-rich approach is often encouraged, for instance through the National Curriculum, without taking into account the interdisciplinary nature of the climate change and sustainability issues and the value of the action-oriented approach (Sinakou *et al,* 2019; Sass *et al,* 2020). An action-oriented pedagogy is needed to support not only learning about these issues, but also developing the knowledge, confidence and willingness to act. The *Growing Wild Citizens @School* programme shows how children can be supported in learning about food systems and healthy eating, using an interactive and hands-on approach, combining indoor with outdoor learning, including growing plants both inside and outside of the classroom, as well as learning about how to enhance biodiversity within their school grounds. Children might live in an apartment or have no access to outside space, thus maximising the opportunities offered by school grounds as sites for learning (Austin, 2022; Malone & Tranter, 2003); the knowledge of where food comes from and how it grows can provide children with insights into and understanding of the food system, food security, sustainability and the environment.

**"Children might live in an apartment or have no access to outside space, thus maximising the opportunities offered by school grounds as sites for learning."**

As shown in this study, children perceive their involvement in such work as important, exhibiting both social and environmental citizenship, drawing on food systems knowledge to explain why it is important to grow food sustainably, and can use their actions as evidence of their growing confidence in making a difference within their local settings. Although this is a small-scale, qualitative study drawing on the perceptions and experiences of children in only two classes and two school settings, the evidence provided for how children see their role in making a difference, and the learning that takes place both from a conceptual and citizenship

perspective, indicates the potential of programmes such as *Growing Wild Citizens @school* for supporting children's engagement with environmental challenges and their contribution towards solutions.

Children's engagement with the programme and insights from their participation strengthen the previous findings from *Wild Citizens*, that primary school children can act as agents of change within their local settings (Christodoulou & Grace, 2024). Educators should therefore maximise children's opportunities for *being* citizens, able to shape and influence their communities and societies at the present time, and not solely for *becoming* citizens in the future (James, 2010); we need children to have the capacity, willingness and knowledge to act now.

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## REFERENCES


Ares, G., De Rosso, S., Mueller, C., Philippe, K., Pickard, A., Nicklaus, S. & Varela, P. (2024) 'Development of food literacy in children and adolescents: implications for the design of strategies to promote healthier and more sustainable diets', *Nutrition Reviews*, **82,** (4), 536–552

Austin, S. (2022) 'The school garden in the primary school: meeting the challenges and reaping the benefits', *Education 3-13,* **50,** (6), 707–721. https://doi.org/10.1080/03004279.2021.1905017

Baroni, L., Filippin, D. & Goggi, S. (2018) 'Helping the Planet with Healthy Eating Habits', *Open Information Science*, **2,** (1), 156–167. https://doi.org/10.1515/opis-2018-0012

Braun, V. & Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology,* **3,** (2), 77–101

Christodoulou, A. & Grace, M. (2024) 'Becoming "Wild Citizens": Children's articulation of environmental citizenship in the context of biodiversity loss', *Science & Education,* **(34),** 969–99. https://doi.org/10.1007/s11191-024-00558-4

Department for Education (2022) Policy paper: *Sustainability and climate change: a strategy for the education and children's services systems.* Available at: https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy/sustainability-and-climate-change-a-strategy-for-the-education-and-childrens-services-systems

Dimbleby, H. (2021) *National Food Strategy: The Plan.* Available at: https://www.nationalfoodstrategy.org/

Dyg, M.P. & Wistoft, K. (2018) 'Wellbeing in school gardens – the case of the Gardens for Bellies food and environmental education program', *Environmental Education Research*, **24,** (8), 1177–1191. https://doi.org/10.1080/13504622.2018.1434869

Geneva Environment Network (2025) *Food Systems and the Environment.* Available at: https://www.genevaenvironmentnetwork.org/resources/updates/food-systems-and-the-environment/

Greer, K., Walshe, N., Kitson, A. & Dillon, J. (2024) 'Responding to the environmental emergency through education: the imperative for teacher support across all subjects', UCL Open Environment, 6, (1). https://doi.org/10.14324/111.444/ucloe.1987

James, A. (2010) 'To Be (Come) or Not to Be (Come): Understanding Children's Citizenship', *The ANNALS of the American Academy of Political and Social Science*, **633,** (1), 167–179. https://doi.org/10.1177/0002716210383642

Malone, K. & Tranter, P.J. (2003) 'School Grounds as Sites for Learning: Making the most of environmental opportunities', *Environmental Education Research*, **9,** (3), 283–303. https://doi.org/10.1080/13504620303459

Markwick, A. (2023) 'Educating for sustainability', *Journal of Emergent Science,* (24), 5–13

Mensah, K., Wieck, C. & Rudloff, B. (2024) 'Sustainable food consumption and Sustainable Development Goal 12: Conceptual challenges for monitoring and implementation', *Sustainable Development*, **32,** (1), 1109–1119. https://doi.org/10.1002/sd.2718

Montreuil, M., Bogossian, A., Laberge-Perrault, E. & Racine, E. (2021) 'A Review of Approaches, Strategies and Ethical Considerations in Participatory Research with Children', *International Journal of Qualitative Methods*, **(20),** 1–15. https://doi.org/10.1177/1609406920987962

Nielsen, M.K., Dyg, P.M. & Wistoft, K. (2020) 'Outdoor taste education: Danish perspectives on potentials and challenges for taste education in school gardens and outdoor education', *Food, Culture & Society*, **23,** (4), 523–541. https://doi.org/10.1080/15528014.2020.1776013

Poppy, G.M. & Baverstock, J. (2019) 'Rethinking the food system for human health in the Anthropocene', *Current Biology*, **29,** (19). https://doi.org/10.1016/j.cub.2019.07.050

Poppy, G.M., Baverstock, J. & Baverstock-Poppy, J. (2019) 'Meeting the demand for meat – Analysing meat flows to and from the UK pre and post Brexit. Trends in Food Science and Technology', (86), 569–578. https://doi.org/10.1016/j.tifs.2019.01.010

Ratcliffe, M. & Grace, M. (2003) *Science Education for Citizenship.* Maidenhead: Open University Press

Sass, W., Boeve-de Pauw, J., Olsson, D., Gericke, N., De Maeyer, S. & Van Petegem, P. (2020) 'Redefining action competence: The case of sustainable development', *The Journal of Environmental Education,* **51,** (4), 292–305. https://doi.org/10.1080/00958964.2020.1765132

Sinakou, E., Donche, V., Boeve-de Pauw, J. & Van Petegem, P. (2019) 'Designing powerful learning environments in education for sustainable development: A conceptual framework', *Sustainability,* **21,** (11), 5994. https://doi.org/10.3390/su11215994

Siraj-Blatchford, J. (2023) 'Emergent science education for sustainability', *Journal of Emergent Science,* (23), 5–11

United Nations (2023) *United Nations Climate Action: Biodiversity.* Available at: https://www.un.org/en/climatechange/science/climate-issues/biodiversity