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Working Group on Schools: Learning for Sustainability

Sustainable Learning Environments in Schools: Rethinking spaces and places of learning

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Sustainable Learning Environments in Schools: Rethinking spaces and places of learning

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Contents

THIS REPORT:

Education and schools have a significant role to play is helping the EC transition to a more sustainable future as outlined in EC recommendation (2023). The *Working Group on Schools: Learning for Sustainability* is considering how sustainable learning environments can be created and how these can positively influence teaching and learning.

The Working Group will convene in Madrid between the 14th-16th June 2023 to discuss how best to advance policies, strategies and actions in this area and across the region. This input paper, written by Prof Daniella Tilbury, seeks to identify core questions, opportunities and learnings to assist with reframing learning spaces for sustainability and is intended to inform discussions at this meeting.

For more information about the European Commission's work on learning for sustainability see: https://education.ec.europa.eu/focus-topics/green-education/learning-for-environmental-sustainability.

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1. Introduction

The 2022 Council Recommendation on *learning for the green transition and sustainable development* aims to foster greater cooperation at EU level to advance the deep and transformative changes needed in education. It presents a vision that requires '*the purpose, policies, provision and practices of learning and teaching to be fundamentally re-examined'* so that it can contribute to a more sustainable future.[1]

It is within this context that the input paper identifies the innovation and changes needed to rethink and reframe spaces and places of learning, taking into account how learning environments can embody sustainability and shape the lived and educational experiences of pupils, educators and all involved with schooling. The paper also recognises the necessity of schools to adapt to changes in climate as many are experiencing intense winds, flooding and extreme weather conditions that make schools unsafe. Currently, adaptation and infrasctructure resilience have become a reality for schools in many member states.

Redesigning school and classroom environments for sustainability necessarily means extending the learning space beyond traditional areas to encompass the entire school and its surroundings. It also involves the creation of innovative places that can provide a sense of possibility and enhance the use of pedagogies and assessment techniques aligned with participatory learning and futures education. These environments engage and empower learners with options and experiences.

When designed with sustainability principles in mind, schools and learning environments not only foster the development of green skills and competences, but they also support intergenerational learning. Schools can serve as gateways into the community - and school learning environments and spaces can invite engagement and change across villages, towns and cities. Equally, learning for sustainability can be extended to green environments beyond the school as educators work with environment centres, local botanic gardens, nearby farms, forests, lakes or marine enviornments further connecting the efforts of the school with neighbouring environments.

In preparing this paper, the author reviewed research evidence, leading thinking as well as innovative practice recognising that, for most Member States, this is an emergent policy concern. Informed by this state of play, the paper is organised around five key questions:

1. What is meant by a sustainable learning environment?
2. What do sustainable learning environments look like in practice?
3. Why should education authorities, schools and colleges be concerned with sustainable learning environments?
4. What frameworks can help create a sustainable learning environment?
5. What key priorities and insights support national policy efforts in this area?

2. What is meant by a sustainable learning environment?

For the purposes of this paper, a sustainable learning environment is defined as a space, place or building that has a primary purpose of supporting teaching and learning for sustainability. It encourages *engagement and connection* with others as well as the environment and *inspires hope and new visions or possibilities* for a sustainable future.

[1]Council of the European Union (2022) Council Recommendation of 16 June 2022 on learning for the green transition and sustainable development 2022/C 243/01 (p11).

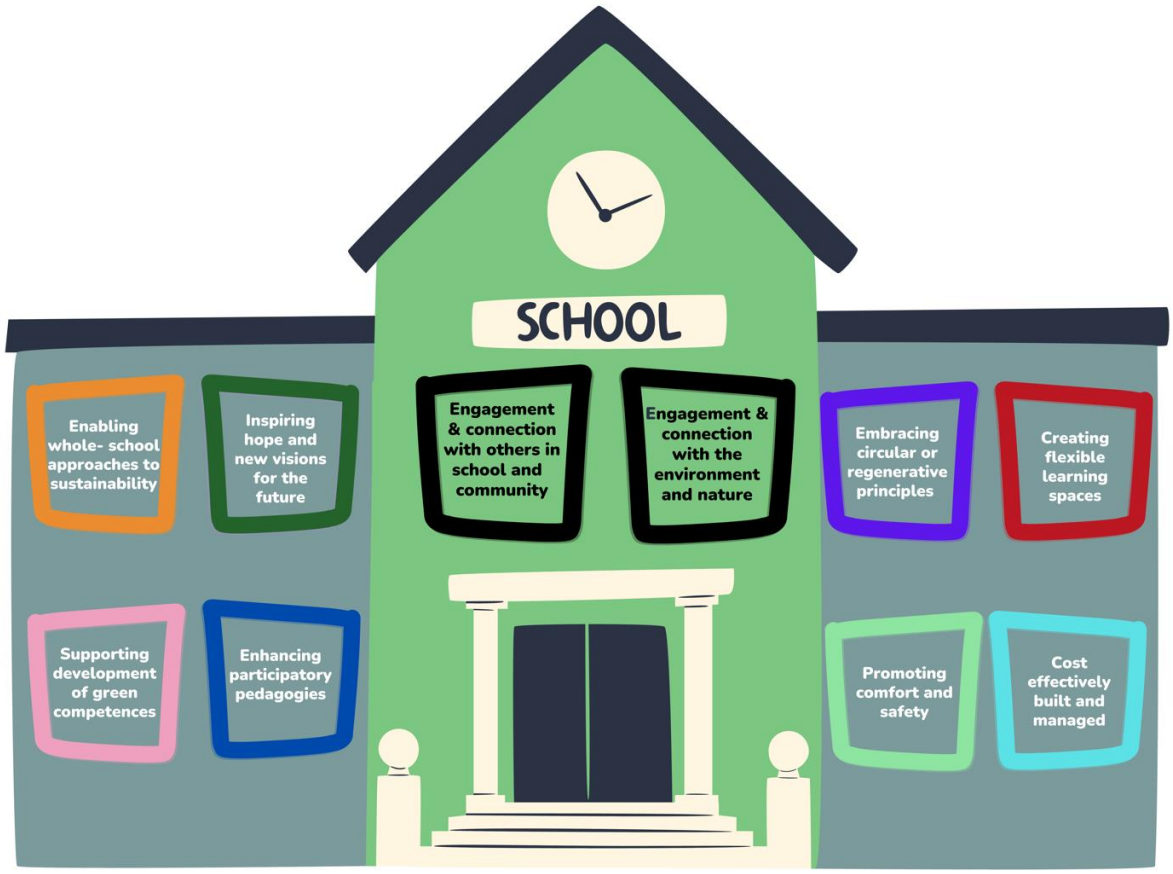
Sustainable learning environments are designed to be *cost-effectively managed* as well as aligned with sustainability, *embracing circular or regenerative principles* (). They often shine a light on natural environments and resources, *promote comfort, safety and well-being* as well as favour *flexible learning spaces* that are more inclusive and supportive of *participatory pedagogies* and active learning strategies. Ultimately these environments enable students and users to live sustainability, creating an optimal experience for learning within a *whole-school approach to sustainability* (see Figure 2).

Figure 1: Circular vs Regenerative principles

Circular principles: A building, space or place built on this principle aims to minimise waste and maximise resource efficiency by keeping materials in use for as long as possible. The intention is to create a closed-loop systems and to constantly *reuse and repurpose* resources such as water, energy, materials and waste.

Regenerative principles: A building, space or place built on this principle seeks to *restore and regenerate* natural resources and ecosystems recognising that the learning environment is connected to a bigger biodiverse and ecological system than that within which the school itself is located.

Figure 2: Sustainable Learning Environment in Schools: Key Components



3. What do sustainable learning environments look like in practice?

The key components captured in Figure 2 and their interplay are best illustrated through the use of examples.

Figure 3: Green Free School, Denmark[2]

If you walk into the Green Free School (Den Grønne Friskole) in Copenhagen, you will find pupils repairing bicycles, collecting rainwater, composting or farming rather than sitting in rows facing a blackboard. The school was a former industrial building that has been redesigned to house an open learing community.

It is one of around 200 eco-schools in Denmark that place eco-pedagogy at the heart of its curriculum. The learning environment they are part of encourages them to be courageous, experiment and take risks. It encourages learners to interact with the innovative and the traditional to create a sustainable future and developing new competences that challenges development or progress without considering inclusive needs or respecting the past. The dimensions of environmental, social and economic sustainability are included in various forms in students' learning experience.

The school buildings are made entirely from sustainable materials and host workshops where pupils learn to sew and use materials such as wood, clay, wax, felt, metal and plastic.

Key components:

Engagement and connection with the environment and nature

Supporting the development of green competences

Embracing circular and regenerative principles

Inspiring hope and new visions for the future

Enhancing participatory pedagogies

Engagement and connection to others in the school and community

[2] Clasper, J. (2020) 'Nature and Environment' https://www.dw.com/en/denmark-copenhagen-sustainability-school-education/a-52341880 accessed 16.5.2; Bahaus Finalists 2023 https://prizes.new-european-bauhaus.eu/finalists (accessed 4.6.23).

Figure 4: National Education Nature Park Initiative[3]

In the UK, the Department for Education has established a National Education Nature Park programme for schools. It invites learners to engage with creating and maintaining green areas in their schools as well as map and share their progress in improving biodiversity and climate resilience across the school buildings and grounds. Uniquely, this initiative joins up the school estates from across the nation *creating a virtual nature park.*

The Nature Park initiative has encouraged students to create pollinator-friendly habitats, to dig ponds and to establish climate resilient green areas. These efforts are supported with curriculum materials for primary and secondary school teachers to connect this indoor and outdoor learning with curriculum activities. The learning is intended to build green skills and competences alongside the traditional knowledge-based curriculum, whilst local NGOs are also involved in supporting schools with the practical action projects.

The Nature Park's Online Hub enables the sharing of best practice across the education estate. Over time, the hub will go beyond biodiversity mapping to document the climate resilience of schools to flooding, overheating and air quality challenges.

Key components:

Engagement and connection with the environment and nature

Enhancing participatory pedagogies

Supporting the development of green competences

Engagement and connection to others in the school and community

[3] UK Department for Education (2023) National Education Nature Parks, communication materials.

Figure 5: Koning Willem College[4]

In the Netherlands, Koning Willem College embraced a vision of the college as a 'village' with a circular ecosystem, integrating sustainability in curricula, pedagogy and school facilities and spaces. The College embraces green technology and sees it as an essential aspect of sustainable living encouraging students to make these innovations part of their lives. As well as using electric cars, bicycles, solar panels, green insulation and sustainable heating and ventilation, the College has an 'energy transition house'. This 'house' acts as an innovative practice centre that brings together skills from across the community and state of the art sustainability buildings and creating new pathways for a sustainable future.

Key components:

Embracing circular and regenerative principles

Inspiring hope and new visions for the future

Enhancing participatory pedagogies

Supporting the development of green competences

Engagement and connection to others in the school and community

Engagement and connection with the environment and nature

Whole-school approach to sustainability

[4] Koning Willem College, https://www.kw1c.nl/?gclid=CjwKCAjw04yjBhApEiwAJcvNoZFgnA27bVqOT1x6Scl--Jz5BJpxhmqXgb8PXehSARksNLVgA7ZRXhoC9EEQAvD_BwE (accessed 15.5.23).

Figure 6: PEDIA: Promoting Energy Efficient and Developing Innovative Approaches in Schools[5]

PEDIA is an innovative project aiming to create near zero energy consumption and improve the education quality in schools across Cyprus. It is a collaboration between the Cyprus Ministry of Education, Sport and Youth's unit for Education for Environment and Sustainable Development and of the Cyprus Energy Agency. It is expected that till 2028, 55 school buildings, from all education levels, will be transformed to almost zero-energy and sustainable buildings. The project is possible thanks to the assistance offered by the EU's HORIZON 2020 programme and the Recovery and Resilience Facilities that have allocated 20 million euro to the project.

Schools are selected using a tool that assesses the school's building energy consumption levels as well as the potential of engagement opportunities of pupils and teachers. PEDIA gives priority to climate resiliency as well as to establishing school buildings as an inherent part of the sustainability education process. The creation of green roofs, the installation of passive cooling and heating systems, as well as the use of automations and smart technologies all form part of the pupils learning experience.

Enhancing participatory pedagogies

Embracing circular and regenerative principles

Supporting the development of green competences

[5] Source: Stella Hadjiachilleos and Aravella Zachariou correspondence 1.6.23

4. Why should education authorities, schools and colleges be concerned with this?

The physical surroundings of learners in schools are increasingly recognised as influencers on *what* and *how* learners learn. Sanoff[6] has labelled the school environment as 'the second teacher' acknowledging the impact buildings, facilities and grounds have on pedagogical practice and student learning experiences.

In a review of research, Barrett and his colleagues[7] evidence how the plans and design of school infrastructure is a key factor shaping learning outcomes. They review child development literature and correlate it with positive experiences in the school environment. The study presents a clear evidence trail to establish that the school classrooms and infrastructure choices do influence learning. To accompany these findings, the authors map the key considerations for those planning and developing new schools and call for spaces and places:

- that make use of *natural conditions, light and resources*;
- that create *opportunities for participation* and have common areas for interaction
- that are designed with *flexibility in mind* so that they can be adapted to suit age-appropriate needs and possibilities; and,
- support *inspiration* by providing diversity of colour, complexity and interest to stimulate learners; and,
- that are designed to reflect the *climatic and cultural conditions* of the school.[8]

These physical characteristics are seen to improve the quality of learning across the education sector. By drawing on evidence, Barrett and colleagues make a compelling case as to why schools need to be upgraded, and for new schools to be designed, to align with these key considerations. They also highlight how *participation* is a mediating factor between learning environments and learning performance stating that a quality learning environment has spaces for reflective thinking, dialogue, participation and engagement that permit the assimilation of knowledge and development of skills for a sustainable future.[9]

Other studies point to the social benefits of sustainably designed environments, specifically documenting how these relate to improvements in the comfort, satisfaction and health.[10] Drawing together the work of scholars, who employ a diversity of methodologies or expertise (in epidemiology, public health, psychology, environmental sciences), US commissioned studies demonstrate how the absence of sustainable principles may negatively affect quality of life and well-being.[11]

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[6] Sanoff, H. (2021). 'Participatory Design: A historical perspective', Journal of Arts & Architecture Research Studies, 2(3), pp. 12-21. doi: 10.47436/jaars.2021.67348.1001

[7] Barrett, P, Treves, A., Shmis, T,Ambasz, D. and Ustinova, M (2019) The Impact of School Infrastructure on Learning A Synthesis of the Evidence Washington; World Bank.

[8] Adapted from Barrett, P, Treves, A., Shmis, T,m Ambasz, D. and Ustinova, M (2019) The Impact of School Infrastructure on Learning A Synthesis of the Evidence Washington,World Bank.

[9] Barrett, P, Treves, A., Shmis, T, Ambasz, D. and Ustinova, M (2019) The Impact of School Infrastructure on Learning A Synthesis of the Evidence Washington,World Bank.

[10] Higgins, S., Hall, E., Wall, K., Woolner, P., & McCaughey, C. (2005). The impact of school environments: A literature review. Newcastle upon Tyne, UK: The Centre of Learning and Teaching, University of Newcastle. http://128.240.233.197/cflat/news/DCReport.pdf (accessed 15.23); US Department of Energy, (2003) The Social Benefits of Sustainable Buildings https://www1.eere.energy.gov/femp/pdfs/buscase_section3.pdf US Government (accessed 15.5.23).

[11] US Department of Energy (2003) The Business Case for Sustainable Buildings in Federal Facilities, US Government (accessed 16.5.23) and Olsen S, Kellum S. (2003) The Impact of Sustainable Buildings on Educational Achievements in K-12 Schools Leonardo Academy https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.175.944&rep=rep1&type=pdf (17.5.23).

Alongside this work, there is research that documents how student engagement with the school grounds and facilities can take many forms to include growing their own food, monitoring biodiversity, planting trees, keeping bee hives or establishing repair cafes on site. These smaller scale studies suggest that this lived experience can improve focus, quality and inclusivity in learning as well as develop sustainability skills and competences needed to transition towards sustainability.[12] The use of school environment in this way is also seen to draw in the local community as universities, NGOs and community groups come to the school to share their expertise. These initiatives break down barriers that may exist, and inspire others to join up local efforts in creating sustainable environments. They can also serve as the focal point for life-long learning programmes as schools are used for evening or weekend classes[13] and intergenerational learning.[14] Such efforts establish buy-in from the wider community but also contribute to support EU biodiversity and climate commitments.

In addition, there are savings to be had in the long-term investment of spaces and places built upon sustainability principles. Sustainable learning environments have shown to have lower maintenance costs[15] as they include features and elements that reduce energy consumption and curtail energy cost and water bills. Increasingly, educational structures and spaces include the design and technology needed to generate energy and collect water permitting greater self-sufficiency in the management of natural resources. It is also well known that green materials (such as recycled decking and roofing) used to construct sustainable buildings and spaces last longer as they can endure for years exposed to the elements and require less maintenance. These materials are also free from harmful chemical and treatments making the learning environment healthier for all users.[16]

Studies have also established that that frequent contact with green spaces can have a beneficial impact on children's physical and mental health.[17] The early years are seen as especially formative for the development of positive values and responses as children discover and make sense of the natural world.[18] However, not all children have access to green areas and thus cannot benefit from this experience.[19] Creating green spaces in schools can support equal access and enhance the wellbeing of all who learn in these environments especially given that children are spending less time outdoors.

In summary, education authorities, schools and colleges should be concerned with creating sustainable learning environments as these

- optimise conditions for learning and support the development of sustainability competences;

[12] Salama, A. and Adams W. G. (2003). Sustainable Learning Environments: Rethinking the Missing Dimensions. Al Azhar University Engineering Journal-AUEJ, Vol. 7, Special Issue, ISSN-11106406; Schnitzler, T. (2019), 'The bridge between education for sustainable development and transformative learning: Towards new collaborative learning spaces', Journal of Education for Sustainable Development, Vol. 13, No 2, pp. 242–253, doi:10.1177/0973408219873827.

[13] In Malta and Lithuania, schools spaces and facilities are used by youth organisations, community groups and the retired population over the weekend and evening to extend their learning and practice. See: European Commission, Directorate-General for Education, Youth, Sport and Culture (2022), Learning for the green transition and sustainable development : staff working document accompanying the proposal for a Council recommendation on learning for environmental sustainability, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2766/02392 (accessed 1.5.23).

[14] O'Donoghue, R, Taylor, J, and Venter, V (2018) How are learning and training environments transforming with ESD? In: Issues and trends in education for sustainable development, p. 111-131, Paris :UNESCO.

[15] New School of Architecture and Design (2023) https://newschoolarch.edu/blog/10-benefits-of-green-building/ (accessed 15.4.23).

[16] New School of Architecture and Design (2023) https://newschoolarch.edu/blog/10-benefits-of-green-building/ (accessed 15.4.23).

[17] European Commission, Directorate-General for Education, Youth, Sport and Culture (2022), Learning for the green transition and sustainable development : staff working document accompanying the proposal for a Council recommendation on learning for environmental sustainability, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2766/02392 (accessed 1.5.23).

[18] Tilbury (1993) 'Environmental Sustainability in Early Childhood Education' Children and Childhood Environments Washington; NAAEE

[19] Stallmann, M. (2010) Sustainable Learning Environments: The Issues and Potential Policy Responses PhD Thesis https://core.ac.uk/download/pdf/35463409.pdf Lincoln University, New Zealand (accessed 1.5.23).

- provide a healthy, safe and comfortable environment for all users;
- are cost effective and more durable;
- address issues of inequality and wellbeing; as well as
- help communities to transition towards more positive sustainable futures.

5. What frameworks can help create a sustainable learning environment?

Creating sustainable learning environments is not an easy task. There are numerous frameworks (steps and components) that are associated with a sustainable learning environments. Variations between these frameworks are subtle as there are significant overlaps between them; the frameworks may use different terminology but tend to cover the same ground.

Figure below outlines a framework which visually depicts the different aspects of a process required to create, reform or redesign school places and spaces to align with sustainability. It has been chosen for its simplicity and for its applicability to school enviroments.

The framework points to how creating a sustainable learning environment requires a high-level policy commitment. This is necessary if efforts in this area are to be upscaled and for schools to have the land, financial resources and support needed to create these[20] (***Land, Planning and Finance***). Secondly, to effectively design these learning environments, interdisciplinary expert teams to include, for example, architects; psychologists; education experts, environemental scientists and engineers need to be involved to ensure a holistic approach to sustainability. Equally, the process of design must involve the users (students, teachers, administrators and support staff) to ensure it is fit for purpose and inclusive to a diversity of needs (***Design***). Thirdly, it is important to ensure that the environmental considerations translate from the design to the construction phase (***Construction***).

Figure and also involves the sourcing and procurement of materials needed to create these environments. Once the sustainable learning space or place is established, protocols need to be set up for effective management and maintenance which in turn will require training of users as well as those responsible for the school facilities *(**Management and Use**).* Finally, as the buildings or spaces come to the end of their life cycle or require repurposing, it is important to consider ways to minimize the carbon footprint of the redevelopment (***Demolition and Redevelopment***).

As mentioned, the frameworks could be adapted to guide national policy and programme developments in this area. However, given sustainable schools' requirements to integrally connect curriculum and learning with the physical building and spaces to attain a whole-school approach to sustainability, it could be argued that there is a need for a bespoke framework that could support the reform, adaptation or creation of sustainable spaces and places in schools.

[20] There are examples where schools themselves have driven the changes independently of this policy drivers.

Figure 7: Stages in Creating Sustainable Learning Environments[21]

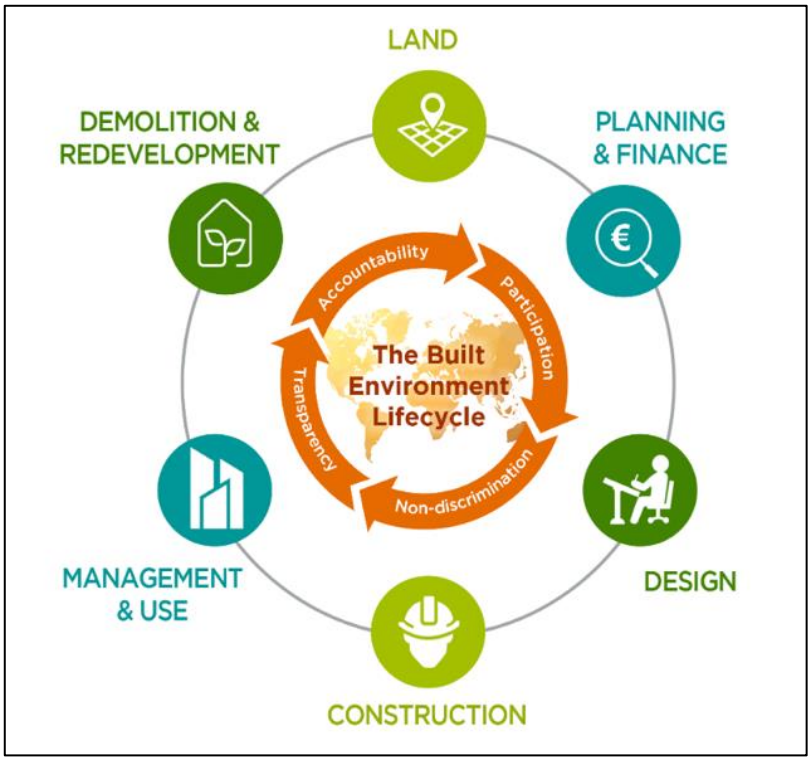


Photo: Centre for green schools US[22]

[21]Dignity by Design (2020) https://www.ihrb.org/focus-areas/built-environment/?gclid=Cj0KCQjwwtWgBhDhARIsAEMcxeDge0gjMxQdKRuId4dP5knyXzmaA-s1VntI0Sqxvie28Cy9-r8Aqx4aAusaEALw_wcB Institute for Human Rights and Business (accessed 14.5.23)
[22] Source: centerforgreenschools.org

Figure 8: Seven Principles of Sustainable Construction[23]

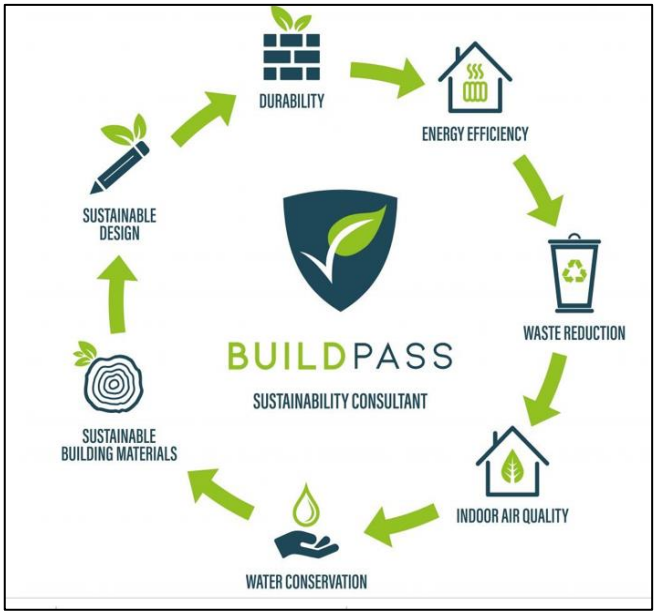
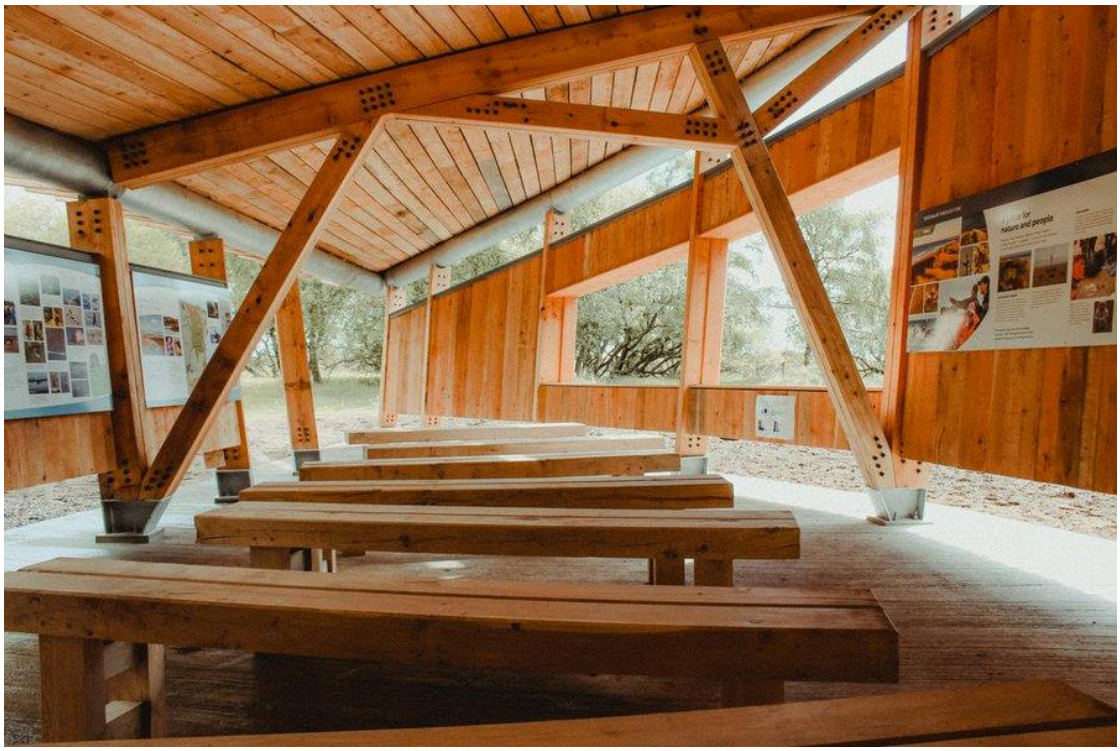


Photo: #GenZeroClassroom[24]

[23] https://buildpass.co.uk/blog/the-7-principles-of-sustainable-construction/
[24] #GenZeroClassroom – CoP26 launch of the Generation Net Zero Classroom, UK Government.



6. What key priorities and insights support national policy efforts in this area?

6.1 Pressing need for renovating school infrastructure

- There is a pressing need to adapt physical sites of learning as these have not evolved to accommodate the changing needs of learners or communities.[25] Many learning environments are poorly equipped for 21st century learning which is increasingly learner-centred and diverse regarding the ways students learn.[26]
- School buildings and grounds often need basic renovation to improve hygiene, health and comfort accessibility as well as investment to reduce climate emissions.[27]
- To adapt to climate change, schools need to be engaged in the development of a sustainability plan with national agencies issuing guidelines to support this aspect of the transition[28].
- The EU has committed to climate change targets and to a green transition. The school sector must play its part to attain these high-level commitments and invest in infrastructure projects to save energy in buildings and reduce the environmental footprint of the sector.[29]
- Schools can act as catalysts in the communities they serve. Sustainable buildings, grounds and facilities can help parents and support the local community in its own transition towards a more sustainable future.

6.2 Finance and funding programmes

- Reviewing current expenditure with a long-term perspective would necessarily mean investment in spaces and places built upon sustainability principles as these have lower maintenance costs and curtail energy and water bills.[30] These savings are increasingly urgent given the escalating costs of energy consumption.
- Education infrastructure accounts for 8% of education expenditure in EU Member States and is considered to be the largest share of national financial investment in

[25]Sanoff, H. (2021). 'Participatory Design: A historical perspective', Journal of Arts & Architecture Research Studies, 2(3), pp. 12-21. doi: 10.47436/jaars.2021.67348.1001

[26]Blyth, A.,Velissaratou, J. and Caddy, J. (2019) Analytical Framework for Case Study Collection Effective Learning Environments OECD Directorate for Education and Skills). EDU/EDPC/GNEELE(2018)3/REV1

[27]Blyth, A.,Velissaratou, J. and Caddy, J. (2019) Analytical Framework for Case Study Collection Effective Learning Environments OECD Directorate for Education and Skills). EDU/EDPC/GNEELE(2018)3/REV1 Jan 2019; European Commission, Directorate-General for Education, Youth, Sport and Culture (2022), Learning for the green transition and sustainable development : staff working document accompanying the proposal for a Council recommendation on learning for environmental sustainability, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2766/02392 (accessed 1.5.23).

[28] England require schools to develop these sustainability or climate plans; The ambition in England is that "By 2025, all education settings will have nominated a sustainability lead and put in place a climate action plan". This includes early years settings, schools, multi-academy trusts, colleges, and universities. Schools Ireland are encouraged to take this challenge of developing a school climate plan. Ireland is looking into locking this action as a requirement in its forthcoming national strategy in learning for sustainability.

[29]Stallmann, M. (2010) Sustainable Learning Environments: The Issues and Potential Policy Responses PhD Thesis https://core.ac.uk/download/pdf/35463409.pdf Lincoln University, New Zealand (accessed 1.5.23).

[30]Osti.gov. (2001) Energy-Smart Building Choices: How School Administrators and Board Members Are Improving Learning and Saving Money https://www.osti.gov/biblio/786361 (accessed 17.5.23).

education.[31] Energy costs take a significant percentage of this allocation. This percentage would have increased significantly in the last year given recent energy challenges triggered by energy instability and war in Ukraine. Estimates calculate that energy expenditure could be reduced by as much as 30% through the replacement of inefficient boilers and lighting with additional savings to be had through increased insulation and other measures.[32] The escalating costs mean inaction is costly.

- The EU supports Member States' efforts to upgrade existing sites and invest in new school buildings through numerous funding programmes, including InvestEU (the Social Investment and Skills Window), European Regional and Development Fund (ERDF) and the Recovery and Resilience Facility (RRF) and more recently, through the New European Bauhaus. The latter is dedicated to the creation of sustainable public spaces and buildings. In addition, Erasmus+, Horizon Europe and LIFE can also accelerate the adaptation and creation sustainable learning environments through networking and international collaboration.

6.3 Designing spaces for hands on engagement

- Designing spaces and places that invite practical, hands-on and engaged care and management of the environment is key.[33] These serve to empower, boost student motivation and also show a positive way forward to help overcome negative perspectives and feelings about the future amongst learners and those involved with the school.[34]
- Other positive impacts of hands-on engagement include the development of critical thinking, creative response as well as decision-making and citizenship skills, all key aspects of green competences.[35] These hands-on experiences should not be limited to learning in nature but also to implementation of procurement processes and management of school buildings, for example.

6.4 Powerful learning

- The process of creating or adapting for sustainable learning environments in nurseries, schools, colleges and learning centres can in itself provide transformative learning opportunities.[36] Involving the users and learners at each stage of the decision-making process is key.[37] Learners can actively participate in the experience

[31] European Commission, Directorate-General for Education, Youth, Sport and Culture (2022), Learning for the green transition and sustainable development : staff working document accompanying the proposal for a Council recommendation on learning for environmental sustainability, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2766/02392 (accessed 1.5.23).
[32] Large energy-efficient windows practically eliminate heat exchange, meaning rooms require less heating and cooling.
[33] Osti.gov. (2001) Energy-Smart Building Choices: How School Administrators and Board Members Are Improving Learning and Saving Money https://www.osti.gov/biblio/786361 (accessed 17.5.23).
[34] European Commission, Directorate-General for Education, Youth, Sport and Culture (2022), Learning for the green transition and sustainable development : staff working document accompanying the proposal for a Council recommendation on learning for environmental sustainability, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2766/02392 (accessed 1.5.23).
[35] Bianchi, G., Pisiotis, U. and Cabrera Giraldez, M., GreenComp The European sustainability competence framework, Punie, Y. and Bacigalupo, M. editor(s), EUR 30955 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-46485-3, doi:10.2760/13286, JRC128040. https://joint-research-centre.ec.europa.eu/greencomp-european-sustainability-competence-framework_en.
[36] Salama, A. and Adams W. G. (2003). Sustainable Learning Environments: Rethinking the Missing Dimensions. Al Azhar University Engineering Journal-AUEJ, Vol. 7, Special Issue, ISSN-11106406
[37] Blyth, A.,Velissaratou, J. and Caddy, J. Analytical Framework for Case Study Collection Effective Learning Environments OECD Directorate for Education and Skills). EDU/EDPC/GNEELE(2018)3/REV1 Jan 2019

of designing and transforming the school so that it is climate resilient, for example. Learning for sustainability is about empowerment and giving the confidence to students to make a difference. Cultivating a culture of learning where pupils and their teachers can inform and influence how their environment is created serves as a powerful learning opportunity.

6.5 Professional development for a sustainable learning environment

- A whole-school approach to sustainability would not be possible without trained and highly motivated educators. Professional development is needed for educators to understand, support and assist the creation of sustainable learning environments in schools and to make effective use of them.
- Teacher education opportunities to understand the vision, aspirations and pedagogical principles of learning for sustainability are needed but also to build skills relating to the practical aspects of how to manage a vegetable garden, map biodiversity on the school grounds; make use of flexible spaces; gather and use data on the carbon footprint of school buildings.
- Educators and support staff need skills and confidence to use technology in support of sustainability. Creating and maintaining sustainable learning environments can require the use of technology especially in the design and modelling process. Equally, mobile phones, tablets and potentially drones and augmented reality can enhance learning and bring nature into classrooms or track sustainability issues in the school grounds live. Technology can connect sustainable learning environments with the learning experience of students and teachers need to know how to best utilise it.[38]

6.6. Policy commitments

- To mainstream sustainable learning environments in Member States, national agencies and authorities must embed relevant policy commitments at the highest level. These policy commitments need to align with funding mechanisms to enable the redesign, adaptation and or retrofitting of existing schools as well as planning and design of new builds to bring alive sustainable learning experiences.
- Policy support can also come in the form of guidelines, formal advice or the establishment of national networks or formal greeing programmes (such as eco-schools) that green school grounds and facilities. Incentives can also be offered to teachers and school leaders for training in this area. As an example, the city of Brusseels has developed a guide on how to self-assess the quality of the learing spaces in schools[39]

[38] For example: In Latvia, technology used to connect the outdoor learning experiences with classroom activities https://www.csod.si/stran/programme.
[39] Dawance, S. et al. 'My school, a space of quality : guide for schools' ('Mon Ecole, un espace de qualité : guide pour l'enseignement fondamental'), 2018, mon_ecole_un_espace_qualite_0.pdf (perspective.brussels)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