



PRACTICAL RESOURCE

Biophilic Learning Environment Manual

Practical guidance for schools, learning centres and hybrid education spaces

Project	Supporting Learning Environments in Digital Education (LED Education)
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Based on / derived from	D3.1 Research Report on Educational Methodologies; WP2 biophilic learning environment design approach
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ABOUT THIS RESOURCE

This practical resource translates LED Education research and project experience into implementation guidance for schools, educators, learning-space coordinators and organisations that want to create healthier, calmer and more supportive physical and hybrid learning environments.



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Executive Summary

This manual presents practical guidance for designing, using and maintaining biophilic learning environments in schools, learning centres and hybrid education spaces. It translates the research basis developed in LED Education Deliverable D3.1 and the project approach to establishing a biophilic learning environment into a user-friendly implementation guide.

The central idea is simple: the physical environment is not neutral. Space, light, sound, natural elements, furniture, ventilation, outdoor access and digital infrastructure influence how students concentrate, communicate, regulate emotions and participate in learning. A biophilic learning environment uses nature-connected design and learner-centred organisation to support wellbeing, attention, engagement and academic development.

The manual is especially relevant for schools working with online, hybrid or blended learning, where students may spend long periods on screens and need additional support for concentration, social connection and emotional wellbeing. It shows how digital learning can be strengthened when it is combined with flexible physical spaces, quiet areas, greenery, outdoor learning opportunities, non-screen routines and responsive adult support.

The guidance is scalable. A school does not need to build a new centre to apply the LED approach. Improvements can start with one classroom, one quiet corner, a small set of plants, better storage, clearer routines and planned screen-time breaks. More advanced implementation can include dedicated hybrid learning rooms, outdoor learning routes, student-maintained green areas and whole-school space management strategies.

KEY PRINCIPLE

The physical environment is not neutral. Space, light, sound, natural elements, furniture, ventilation, outdoor access and digital infrastructure all shape how learners concentrate, communicate, regulate emotions and participate in learning.

Purpose and Target Users

The purpose of this manual is to help schools and learning organisations apply biophilic learning environment principles in a practical and realistic way. It is designed as a public resource for the LED Education results page and can be used as a starting point for internal school planning, teacher discussions, classroom redesign or pilot activities.

This resource is intended for:

- school leaders planning improvement of classrooms or student support spaces;
- teachers and tutors working with online, hybrid or blended learning;
- learning environment coordinators, architects and interior designers supporting schools;
- organisations developing inclusive, wellbeing-oriented education programmes;
- municipalities or education authorities interested in scalable school innovation.

The manual does not prescribe one fixed model. Instead, it sets out principles and practical steps that can be adapted according to the age of learners, available premises, school timetable, staffing, budget, accessibility needs and national requirements.

GUIDANCE NOTE

Schools and organisations should adapt the recommendations to national regulations, safety requirements, available premises, learner age, accessibility needs and safeguarding procedures.

What Is a Biophilic Learning Environment?

A biophilic learning environment is an educational space that intentionally connects learners with natural elements and nature-inspired design. The term biophilia refers to the human tendency to seek connection with nature and living systems. In education, biophilic design applies this idea to classrooms and school spaces by integrating natural light, plants, fresh air, natural materials, views of greenery, calm colours, outdoor learning and sensory comfort.

Biophilic design is not only decoration. It is a way of organising the learning environment so that it supports health, attention, emotional regulation and participation. In a school context, this may include indoor greenery, access to daylight, better ventilation, natural textures, quiet corners, outdoor lessons, school gardens, flexible seating and spaces that allow both social interaction and retreat.

The LED Education approach understands biophilic learning environments as part of a wider educational ecosystem. Natural elements should work together with digital learning tools, personalised support, socio-emotional learning, student autonomy and inclusive routines. This is particularly important in hybrid education, where students need both digital competence and restorative, human-centred physical environments.

LIGHT	NATURE	CALM	FLEXIBILITY	BALANCE
Natural light and views	Plants and natural materials	Quiet and sensory comfort	Zones for different ways of learning	Digital learning + restorative green time

Why Biophilic Design Matters in Education

Research reviewed in D3.1 indicates that learning environments influence student engagement, mental health, attention and academic performance. Biophilic design is relevant because it responds to several needs that are visible in contemporary education: stress and anxiety, digital fatigue, reduced attention, limited outdoor time, sensory overload and lack of informal social connection.

Focus	Educational relevance
Attention and concentration	Students often need sustained attention for online lessons, reading, writing, tests and independent work. Natural views, greenery and outdoor breaks can support attention restoration by giving the mind opportunities to recover from intensive concentration. A classroom with access to daylight, plants or a calm view can therefore contribute to better focus than an overstimulating or visually sterile space.
Stress reduction and wellbeing	Natural elements can contribute to a calmer atmosphere. D3.1 highlights the relevance of stress reduction theory, which suggests that natural views and natural elements can reduce stress and physiological arousal. In schools, lower stress can support better mood, behaviour, communication and readiness to learn.
Sensory comfort and inclusion	Many learners experience sensory discomfort in traditional classrooms because of noise, harsh lighting, crowding or lack of quiet areas. Biophilic environments can provide softer sensory input through natural textures, plants, calm colours, daylight and quiet zones. This is especially relevant for students who need lower-stimulation spaces or additional emotional regulation support.

Focus	Educational relevance
Engagement and participation	Greenery, gardens, natural materials and outdoor learning can make education more active and meaningful. Nature-connected spaces invite curiosity, movement, observation, conversation and project-based learning. This supports engagement not only through academic tasks, but also through practical and social participation.
Screen-time and green-time balance	Digital learning is an important part of modern education, but it must be balanced with physical movement, social contact, rest and nature connection. D3.1 emphasises the need to integrate digital innovation with biophilic environments, rather than treating technology and nature as opposites. The goal is not to remove screens, but to use them purposefully and combine them with restorative green-time routines.

The LED Education Approach

LED Education addresses digital education not only as a technological challenge, but as a wellbeing and learning environment challenge. The project combines digital tools, personalised learning, socio-emotional support and biophilic design to create more inclusive and supportive conditions for learners.

The project work plan identifies WP2 as the work package responsible for establishing the biophilic learning environment. This includes identifying and renting suitable educational space, implementing biophilic design features, setting up classrooms, communal areas and specialised spaces, and ensuring that the learning environment can support diverse learning activities. D2.2 is described in the project documentation as the design and implementation report for the biophilic learning environment.

D3.1 provides the research basis for this approach. It reviews digital tools, personalised learning, socio-emotional learning, biophilic learning environment design and the interplay between technology and nature. The findings support a blended approach in which digital innovation is aligned with human-centred, nature-based design.

In practical terms, the LED approach means that schools should design learning spaces where students can:

- use digital tools effectively without excessive fatigue;
- access quiet and calm spaces when concentration or regulation is needed;
- participate in social, practical and project-based activities;
- experience greenery, natural light, fresh air and outdoor learning;
- develop autonomy by choosing suitable spaces and taking care of shared materials;
- receive support from teachers, tutors or mentors in both academic and socio-emotional aspects of learning.

Core Design Principles

The following principles translate the LED Education research and project approach into practical design guidance. They can be applied at different scales, from one classroom to a whole-school environment.

Principle	Practical meaning
1. Natural light and views	Maximise daylight, use window areas effectively, and where possible provide views of trees, gardens, sky or other natural elements.
2. Indoor greenery	Use plants, living walls, small classroom gardens or other natural elements to create a calmer and more restorative atmosphere.
3. Outdoor learning opportunities	Use schoolyards, parks, gardens, courtyards or walking routes for lessons, reading, reflection, observation and movement breaks.

Principle	Practical meaning
4. Flexible learning zones	Create areas for individual work, group tasks, tutoring, practical activities, quiet reflection and informal social interaction.
5. Quiet and restorative spaces	Provide a calm corner, small room or low-stimulation area for students who need concentration, emotional regulation or reduced sensory input.
6. Natural materials and calm colours	Use wood, cork, textiles, earth tones, nature-inspired patterns and soft visual design where possible.

Core Design Principles - Continued

Principle	Practical meaning
7. Ventilation and air quality	Pay attention to fresh air, temperature, CO2 levels and comfortable indoor conditions, especially during long learning sessions.
8. Acoustic comfort	Use soft materials, room separation, headphones, group norms and flexible room allocation to reduce noise overload.
9. Digital support integrated into space	Plan charging points, devices, headphones, internet access and technical support as part of the physical environment.
10. Screen-time and green-time balance	Combine online learning with movement, outdoor time, practical work, reading and non-screen social activities.
11. Student ownership and routines	Involve learners in maintaining order, caring for plants, storing materials and respecting shared spaces.

Practical Implementation Process

Schools can use the following step-by-step process to introduce biophilic and hybrid learning environment principles without requiring a major renovation.

1 Assess Understand how the existing space is used and where difficulties appear.	2 Zone Create areas for focus, support, collaboration, quiet work, practical activity and digital equipment.	3 Add nature Introduce safe greenery, natural textures, daylight and calm visual elements.
4 Comfort Plan quiet areas, sensory comfort and voice-level routines.	5 Integrate digital Organise internet, charging, devices, headphones and technical support.	6 Balance Build movement, non-screen activity and green time into the learning rhythm.
7 Create order Use storage and clearing routines that support learner responsibility.	8 Use outdoors Treat outdoor and alternative spaces as part of the learning environment.	9 Review Observe, collect feedback and adapt the environment over time.

Practical Implementation Steps for Schools

Step 1 - Assess the existing space

Begin with observation. Before changing the room, understand how it is currently used and where difficulties appear. Teachers and school leaders can ask:

- Where do students concentrate well, and where do they become distracted?

- Which areas are too noisy, crowded or visually overloaded?
- Is there a quiet space for students who need regulation or focused work?
- Do students have access to natural light, plants, fresh air or outdoor areas?
- Where are devices charged, stored and used?
- Do students have a place for personal materials?
- How much of the day is screen-based, and where can green-time or movement be added?

Step 2 - Create functional zones

Even one classroom can be divided into functional zones. These zones do not need permanent walls; they can be created through furniture, shelves, carpets, plants, tables or clear routines.

Zone	Purpose
Focused learning zone	Individual reading, writing, online lessons or independent tasks.
Teacher/tutor support zone	Small-group explanation, mentoring, individual help or feedback.
Collaboration zone	Group work, project tasks, discussion, creative activities.
Quiet/restorative zone	Short breaks, emotional regulation, low-stimulation work, calm reading.
Practical activity zone	Crafts, experiments, building, cooking-related preparation, hands-on tasks.
Digital support zone	Storage and charging of devices, headphones, microphones and technical materials.

Step 3 - Add natural elements gradually

Start with simple and low-cost improvements. Plants, natural textures, calm wall displays, daylight management and nature photographs can change the atmosphere of a room. Prioritise elements that are easy to maintain and safe for students.

- Choose robust, non-toxic plants suitable for indoor conditions.
- Place greenery where it supports calmness without blocking movement.
- Use natural materials such as wood, cork, baskets or textiles where possible.
- Avoid visual clutter; biophilic design should create calm, not decoration overload.
- Use outdoor views and window areas intentionally, for example for reading or reflection.

Step 4 - Plan for quiet and sensory comfort

A biophilic environment should support both social interaction and the need for retreat. Some learners benefit from active group spaces, while others need quiet areas. Schools should avoid expecting all students to use the same space in the same way at all times.

- Create a calm corner with soft seating, plants, books or low visual stimulation.
- Use headphones where noise cannot be fully avoided.
- Reduce unnecessary wall clutter and harsh lighting.
- Agree on voice-level routines for different activities.
- Allow students to move to a quieter area when needed, according to school rules.

Step 5 - Integrate digital learning infrastructure

Digital learning should be reliable and organised. Poor technical arrangements can increase stress and reduce learning time. A hybrid learning space should include clear systems for equipment use and technical support.

- Ensure stable internet access.

- Provide charging points and safe cable management.
- Keep headphones and microphones available for online lessons.
- Have a routine for reporting and solving technical problems.
- Teach students how to solve simple issues independently over time.

Step 6 - Balance screen time with green time

Screen-time balance should be designed into the environment. Students need options to recover from intensive digital work: movement, reading, practical tasks, conversation and outdoor activity. The aim is a healthy rhythm between digital concentration and restorative activity.

- Plan short breaks after longer periods of online work.
- Use outdoor walks, reading or observation tasks when possible.
- Provide non-screen activities such as drawing, crafts, games, building, journaling or discussion.
- Encourage students to notice when they need a break and choose an appropriate recovery activity.
- Use devices outdoors only when they enhance observation, documentation or exploration.

Step 7 - Establish storage and order routines

A calm environment requires order. Personal storage supports student responsibility and keeps learning surfaces available for changing activities. This is especially important in multi-use rooms.

- Use lockers, boxes, shelves or labelled folders for student materials.
- Create an end-of-day clearing routine.
- Return workshop materials immediately after use.
- Keep digital equipment in a designated place.
- Involve students in maintaining shared order.

Step 8 - Use outdoor and alternative spaces

Outdoor areas should be treated as part of the learning environment, not only as break areas. Schools can use courtyards, parks, gardens, walking routes or even window-view observation tasks as part of learning.

- Use outdoor reading or discussion sessions.
- Plan observation tasks linked to science, geography, art or language learning.
- Use walking conversations for reflection or mentoring.
- Connect outdoor learning with digital documentation only when useful.
- Consider weather, supervision, accessibility and safety requirements.

Step 9 - Monitor, reflect and adapt

Biophilic learning environments must be maintained as living systems. Schools should regularly review how the space works and adjust it according to student needs, timetable changes and feedback.

- Observe how students use each zone.
- Ask students and teachers what helps concentration and wellbeing.
- Track noise, technical issues and space conflicts.
- Review whether the quiet area is used appropriately.
- Adjust furniture, routines and materials when needed.

Models for Classroom and School Adaptation

The LED approach is scalable. Schools can apply it at different levels depending on available resources.

Level	Description	Suitable for
Basic classroom retrofit	One classroom is improved with plants, flexible seating, a quiet corner, storage routines and planned non-screen breaks.	Schools starting with limited budget or one motivated teacher/team.
Intermediate support room	A dedicated room is created for hybrid learning, tutoring, quiet work, emotional regulation, small-group activities and digital support.	Schools supporting online/blended learners or students needing additional support.
Whole-school approach	Several classrooms and communal areas adopt shared principles: flexible zones, outdoor learning, digital infrastructure, green-time routines and student maintenance responsibilities.	Schools aiming for systemic change in learning environment culture.

Replication should not be understood as copying the LED Hub exactly. The transferable lesson is that even small environmental changes can support concentration, wellbeing, autonomy and social interaction when they are combined with clear routines and responsive adult support.

TRANSFERABLE LESSON

Replication does not mean copying the LED Hub exactly. Start at the scale your school can maintain: one classroom, one support room or a whole-school approach.

Maintaining a Biophilic Hybrid Learning Environment

Maintenance is essential. A biophilic learning space can lose its positive effect if it becomes overcrowded, noisy, cluttered, technically unreliable or visually chaotic. Maintenance should therefore include physical, sensory, digital and social dimensions.

Maintenance area	What to maintain	Recommended routine
Plants and greenery	Plant health, watering, safe placement, cleanliness.	Assign staff or student helpers; check weekly.
Light and air	Daylight, ventilation, temperature, air quality.	Open/adjust windows where appropriate; avoid blocking light; monitor comfort.
Noise and sensory comfort	Voice levels, sound separation, quiet spaces.	Use headphones, closed doors, quiet zones and group norms.
Furniture and layout	Flexible arrangement and safe movement routes.	Reset room after workshops; review layout monthly.
Digital infrastructure	Internet, devices, chargers, headphones, microphones.	Check before online lessons; keep spare equipment where possible.
Storage and order	Personal belongings, learning materials, project materials.	Use lockers, shelves or boxes; end-of-day clearing routine.
Outdoor access	Routes, safety, supervision, weather readiness.	Plan regular outdoor learning and breaks.
Student responsibility	Respect for shared space, materials and plants.	Use simple classroom responsibilities and visible routines.

Teacher and Tutor Role

The effectiveness of a biophilic hybrid learning environment depends on how adults use it. A room with plants and flexible furniture does not automatically become learner-centred. Teachers, tutors and support staff need to manage the environment intentionally.

Teachers and tutors should:

- observe how students respond to different areas of the room;
- support movement between zones according to learning needs;
- model respect for shared spaces, plants, materials and devices;
- balance screen-based tasks with discussion, movement and practical work;
- use outdoor spaces when they support learning or wellbeing;
- help students develop routines for storing materials and caring for the room;
- support students who need quiet, low-stimulation or emotional regulation spaces;
- collect feedback and adjust the environment gradually.

Professional development is recommended so that teachers understand both the design principles and the pedagogical use of the space. Training should cover flexible classroom management, inclusive routines, digital tool use, outdoor learning, SEL-informed interaction and practical maintenance of the learning environment.

Monitoring and Improvement

Monitoring does not need to be complex. Schools can use simple observation logs and reflection questions to understand whether the environment supports learning and wellbeing.

Monitoring question	Possible evidence
Do students concentrate better in certain zones?	Teacher observation, student feedback, task completion.
Are noise levels affecting learning or wellbeing?	Incident notes, student requests to move, teacher observation.
Is the quiet area used appropriately?	Usage notes, student feedback, teacher reflection.
Are digital tools reliable?	Number/type of technical problems, time lost, support requests.
Are students taking responsibility for the space?	Clean-up routines, storage use, care for shared materials.
Is screen time balanced with green time?	Weekly timetable review, outdoor activity log, break routines.
Are biophilic elements maintained?	Plant care checks, room order, light/air comfort observations.

Quick Implementation Checklist

Schools can use this checklist as a practical starting point.

Checklist item	Practical action
Space assessment completed	Observe current classroom use, noise, light, furniture and student movement.
Flexible zones identified	Define areas for individual, group, quiet, teacher-supported and practical work.
Quiet area created	Provide a calm corner or room for concentration and regulation.
Plants/natural elements added	Use safe, manageable plants and natural materials.
Digital equipment organised	Plan devices, chargers, headphones, microphones and internet access.
Storage system introduced	Use lockers, shelves, boxes or labelled folders.
Screen-time breaks planned	Include movement, reading, practical activity and outdoor time.
Outdoor learning opportunities mapped	Identify schoolyard, nearby park, courtyard or walking route.
Student responsibilities agreed	Involve students in care for plants, materials and shared order.
Monitoring routine created	Use simple monthly reflection notes and feedback.

Conclusions

A biophilic learning environment is not created by adding plants alone. It is created through the combination of natural elements, flexible space, sensory comfort, outdoor opportunities, digital support, student ownership and responsive adult practice. The LED Education approach shows that learning spaces can support both digital transformation and human wellbeing when the physical environment is treated as part of the educational method.

For schools, the most important message is that change can begin small. A quiet corner, better light, a few well-maintained plants, flexible furniture, clear storage, outdoor reading and regular screen-time breaks can already improve the learning atmosphere. Larger-scale implementation can build on these foundations by developing dedicated support rooms, green school areas and whole-school maintenance routines.

The manual therefore offers a practical and scalable pathway for schools wishing to create calmer, healthier and more inclusive learning environments that support concentration, autonomy, social interaction and wellbeing alongside digital learning.

KEY PRINCIPLE

A biophilic learning environment is not created by adding plants alone. It emerges from the combination of natural elements, flexible space, sensory comfort, outdoor opportunities, digital support, student ownership and responsive adult practice.

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SOURCE BASIS

This manual is a public-facing practical resource based primarily on LED Education Deliverable D3.1 and the WP2 approach for establishing the biophilic learning environment. It is intended to support practical adaptation and dissemination rather than replace national building, safety, accessibility or safeguarding requirements.