Small house with one flat

Designing a Sustainable Single-Family Home

Keywords:

sustainability, architecture, space optimization, energy efficiency, green living

Target group:

primary school pupils (ages 6-11)

Objectives:

This activity introduces pupils to the concept of compact and sustainable living through the design of a small single-family home. Pupils will explore how thoughtful spatial planning, environmentally friendly materials, and green technologies — such as solar panels, efficient insulation, and smart appliances — can contribute to comfortable and energy-efficient housing.

Through collaboration and creative model building, they will learn to optimise space, apply sustainable design principles, and reflect on how technological choices in housing can reduce environmental impact and support a more responsible way of living.

General Guideline on Time Allocation:

The duration needed to carry out this activity may vary depending on the specific group of children. Teachers are encouraged to adapt the implementation according to the needs, interests, and dynamics of the group.

In the preparatory phase, teachers may use a variety of activities to introduce and contextualize the chosen topic. These can include discussions, videos, drawings, storytelling, or even a field trip, depending on the age and background knowledge of the children.

The main construction phase, during which children plan and build their urban element using LEGO bricks, should typically not exceed 45 to 60 minutes. However, this phase often stimulates further curiosity and questions among the children, potentially leading to extended engagement or follow-up activities. For more detailed instructions and pedagogical support on how to implement activities of INNO–kids project, please download the Teacher's Methodological Guide.

Materials and Resources Needed:

- Large sheets of paper or cardboard (for base layouts or blueprints)
- Markers, crayons, or coloured pencils (for planning and decorating)
- Recycled materials such as boxes, bottle caps, paper towel rolls, egg cartons, and plastic bottles (for constructing house components)
- LEGO bricks or other types of building blocks (optional, for structural modelling)
- Cardboard boxes of various sizes (for building walls and furniture)
- Fabric scraps (for curtains, bed linens, or soft furnishings)
- Natural materials such as twigs, leaves, or small stones (for landscaping or design accents)
- Imaginative props such as toy furniture or miniature plants (to represent interior elements)

Note: Encourage pupils to use their imagination and repurpose available materials in creative and functional ways. If building blocks are not available, pupils may draw, cut, and construct using paper and craft supplies.

Introduction:

Present examples of small, eco-friendly homes from around the world and highlight key features such as solar panels, green roofs, natural lighting, and water-saving systems. Emphasise how these homes use less energy and fewer materials while still offering everything a person needs.
Explain that pupils will take on the role of home designers and work in groups to plan and build a model of a sustainable single-family home that makes the most of limited space while protecting the environment.

Procedure:

Preparation:
Divide pupils into small groups of three to four members. Begin by introducing the concept of compact living—emphasising how small homes can be designed to be functional, efficient, and environmentally friendly.
Explain the importance of sustainability in housing, including the use of renewable energy sources, energy-efficient appliances, and eco-friendly building materials. Use images or diagrams of small sustainable homes to illustrate features such as solar panels, green insulation, natural lighting, and multifunctional furniture.
Discuss how thoughtful design can improve quality of life while reducing environmental impact. Encourage pupils to consider how smart solutions, such as built-in storage, space-saving layouts, or low-energy technologies, can be integrated into their own home designs.

Construction:

- Provide each group with a variety of materials needed to build their model of a sustainable single-family home. Encourage pupils to brainstorm ideas for how to design a small home that is both space-efficient and environmentally friendly.
- Guide them in incorporating sustainable features such as solar panels, insulation made from recycled materials, energy-efficient lighting, water-saving devices, and the use of natural light. Pupils should also consider how to optimise interior space through the use of multi-functional furniture, built-in storage, and thoughtful room layouts.
- As pupils work on their models, move between groups to offer support, ask guiding questions, and encourage them to explain how their design choices contribute to sustainability and comfort.

Details:

Invite pupils to reflect on how their chosen features contribute to a comfortable, functional, and sustainable home. Support them in integrating both environmental and social aspects into their designs—for example, considering accessibility, affordability, or community connection.

Stories:

- Invite pupils to create short stories based on the homes they designed. Encourage them to imagine living in their compact home and describe a typical day—how they use the space, how the sustainable features make life easier or more comfortable, and how they feel living in an environmentally friendly way.
- Ask them to highlight specific elements such as solar panels, rainwater collection, or energy-saving lighting, and explain how these features help protect the environment.

Presentation:

- Invite each group to present their sustainable home design to the class. Pupils should describe the layout of their home, highlight its space-saving and environmentally friendly features, and explain how these contribute to a better quality of life and reduced environmental impact.
- After each presentation, allow time for classmates to ask questions or share feedback.

Tips:

- Encourage pupils to think creatively when designing small spaces—reminding them that every corner can have a purpose. Support experimentation with unusual shapes, flexible layouts, or materials.
- Relate the activity to real-world examples of compact, sustainable homes from around the world, and discuss how such homes reduce energy consumption and environmental impact.
- Remind pupils that a home should not only be efficient, but also cosy, functional, and suited to the needs of its occupants.

Additional Considerations:

Differentiation:
Provide additional support or simplified instructions for pupils who may require extra assistance. For advanced pupils, offer extension tasks such as researching further sustainable practices or designing more complex models.

Assessment:
Assess pupils based on their participation and engagement during discussions and hands-on activities. Evaluate the creativity, effort, collaboration, depth of understanding demonstrated in their models, critical thinking, ability to provide constructive feedback and presentation skills.

Extension Activities:
Encourage pupils to explore real-life examples of tiny homes, modular houses, or eco-villages. They can also design compact furniture or create floor plans using digital tools. Introduce related career paths such as architecture, green building, or interior design.

Curriculum Connections:

This activity integrates:
Science *(materials, energy, environmental impact, energy conservation)*
Social Studies *(community planning, resource management, economics)*
Art *(design, creativity, spatial reasoning skills)*
Language *(oral communication, storytelling, and listening skills)*

SDG Connections:

- **SDG 11:** Sustainable Cities and Communities – Pupils explore how compact and eco-friendly housing contributes to more inclusive, safe, and sustainable urban living.
- **SDG 12:** Responsible Consumption and Production – The activity encourages the use of recycled materials and efficient use of space and resources in home design.
- **SDG 13:** Climate Action – Pupils learn how energy-efficient homes and smart technologies help reduce emissions and minimise environmental impact.

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