

# Co-designing with Children

## *Intuitive Insights for Growing Minds*

Nimet Hüma Sabırlı · Saumya Grover

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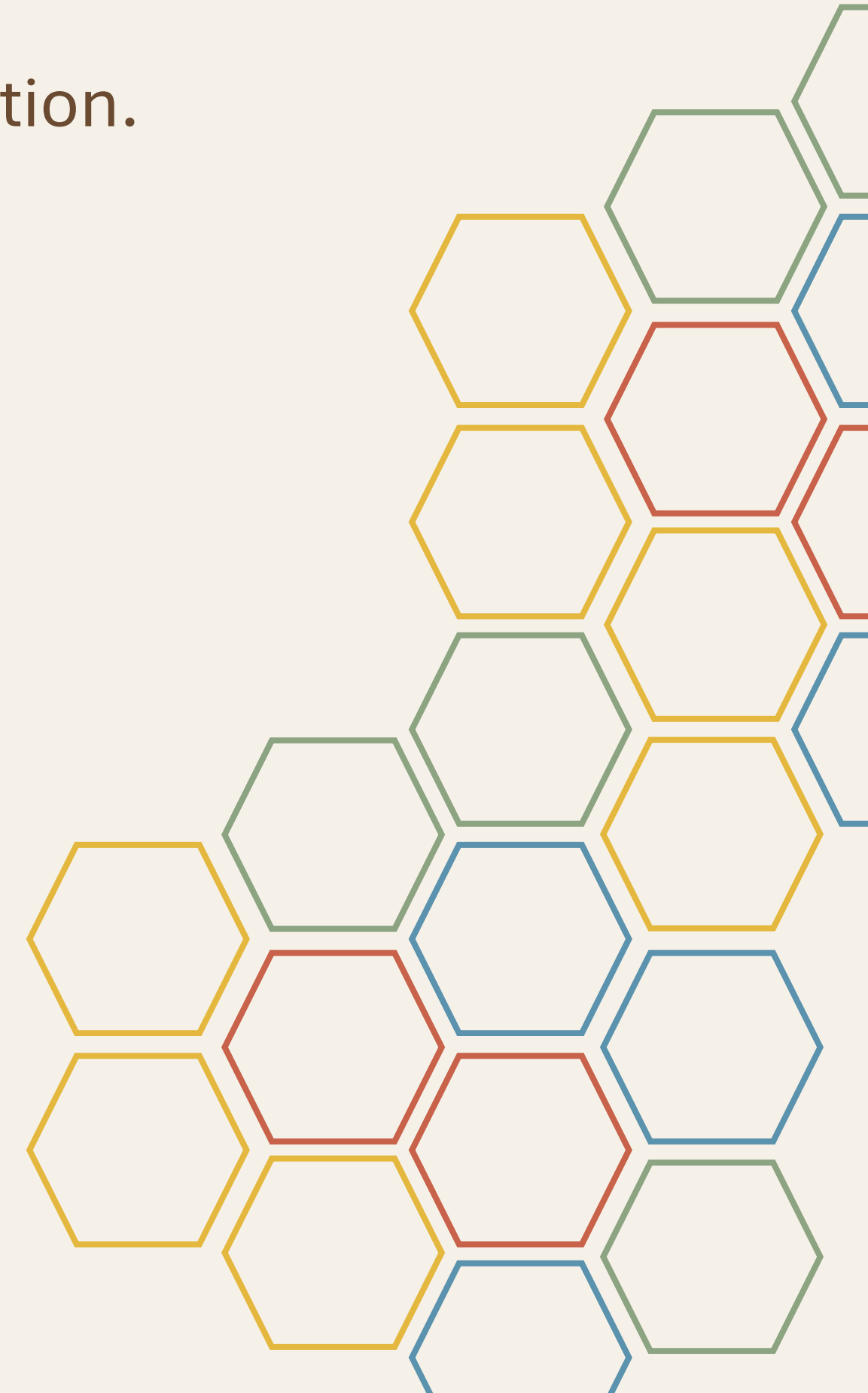


# Why this study?

Environmental education needs more than abstract information.

*From knowing about sustainability to practising it together.*

- Sustainability is often taught through explanation rather than lived experience.
- Young children understand complex ideas through action, materials, movement and peers.
- Growing Minds asks how educational tools can become more meaningful when shaped with children.





## Abstract in one minute

- Co-design with children can reveal learning needs that adult designers may miss.
- Children's intuitive actions, hesitations and play behaviours become research data.
- The game evolved through observation, prototyping and repeated playtesting with children aged 5–7.

### Core claim

*Play-based co-design can work as both a design method and a pedagogical framework.*

The paper frames Growing Minds as a practice-based case study.

# Research question

What does children's participation and design change in education ?

**How can co-designing with children inform the development of sustainable educational tools, while revealing broader pedagogical issues in environmental education?**



# Research Aim and Methodology

This research explores how a sustainable educational game can be developed through children's participation. Instead of focusing only on Growing Minds as a final product, the study treats it as a practice-based case study where children's play behaviours, intuitive responses, collaboration, and challenges became key sources of design and pedagogical insight.

The methodology is informed by participatory design, positioning children as active contributors in shaping the tools and learning systems that affect them.



# Contribution of the paper

Co-design is both methodology and pedagogy.

*The final game matters, but the design process is the main evidence.*

- Methodological contribution: children's intuitive actions become design knowledge.
- Pedagogical contribution: play creates conditions for agency, collaboration and ecological thinking.
- Practical contribution: teachers gain a tangible tool for participatory sustainability education.

# Preliminary research

The theoretical lens connects learning, participation and play.



## Experiential learning

direct experience + reflection



## Reggio Emilia

children as capable meaning-makers



## Game-based learning

rules, challenge, feedback and social interaction



## Constructivist learning

children build meaning through action



## Participatory design

users help shape tools that affect them



## Alternative Education

systemic, participatory and transformative learning

# From literature to design criteria

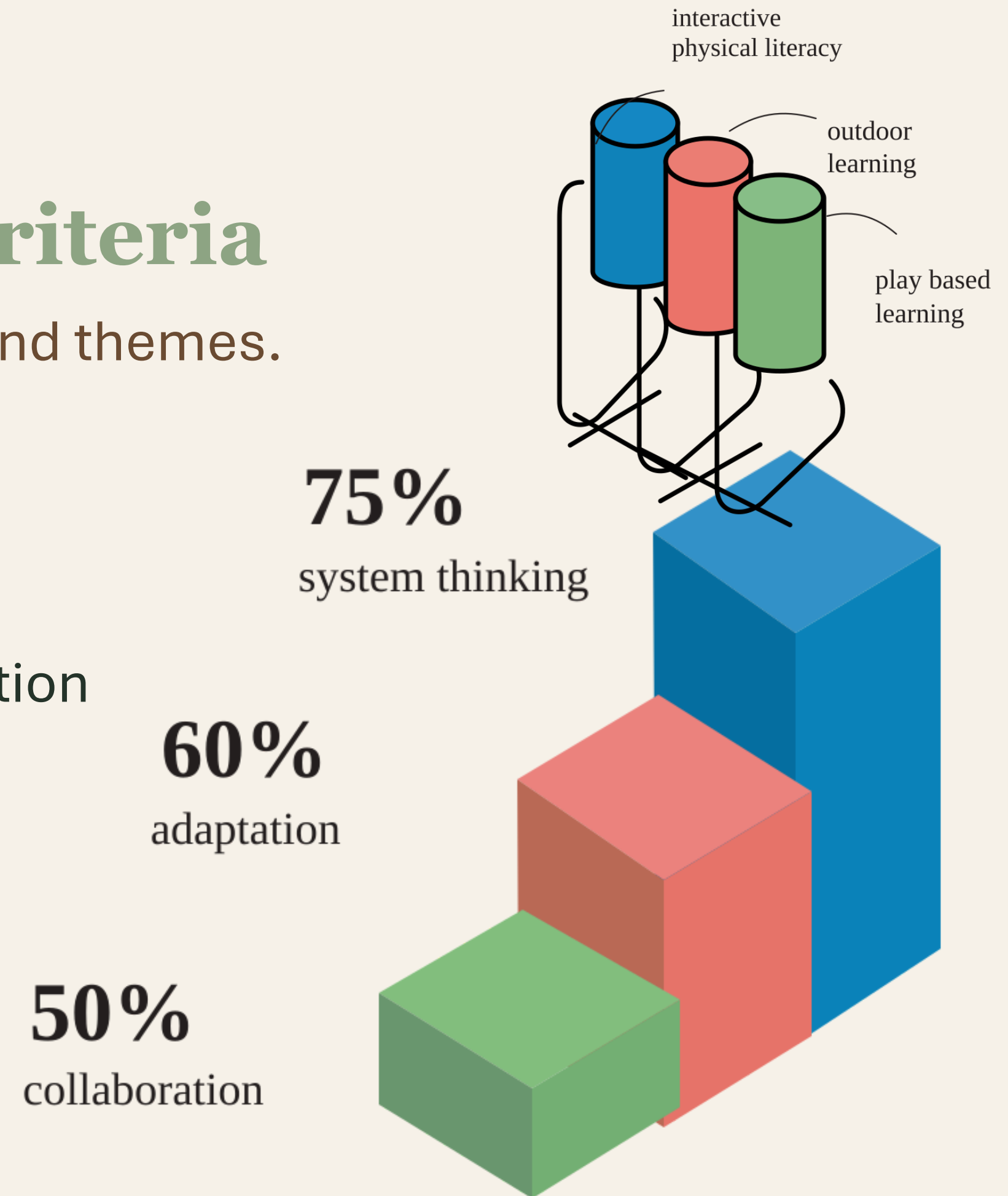
The research became a set of learning goals and themes.

## Learning goals

- Collaboration and communication
- Systems thinking and problem-solving
- Adaptation, responsibility and self-driven action

## Environmental themes

- Food and agriculture
- Water
- Life on land



# Process flow

An iterative, play-based co-design methodology.



*Each cycle informed the next: children's movements, questions, misunderstandings and peer communication shaped the design.*



# Field observations

Learning became visible through behaviour, not only answers.

- How children understood rules, symbols and materials.
- How they asked questions, negotiated decisions and worked with peers.
- Where they hesitated when connecting ecological ideas.

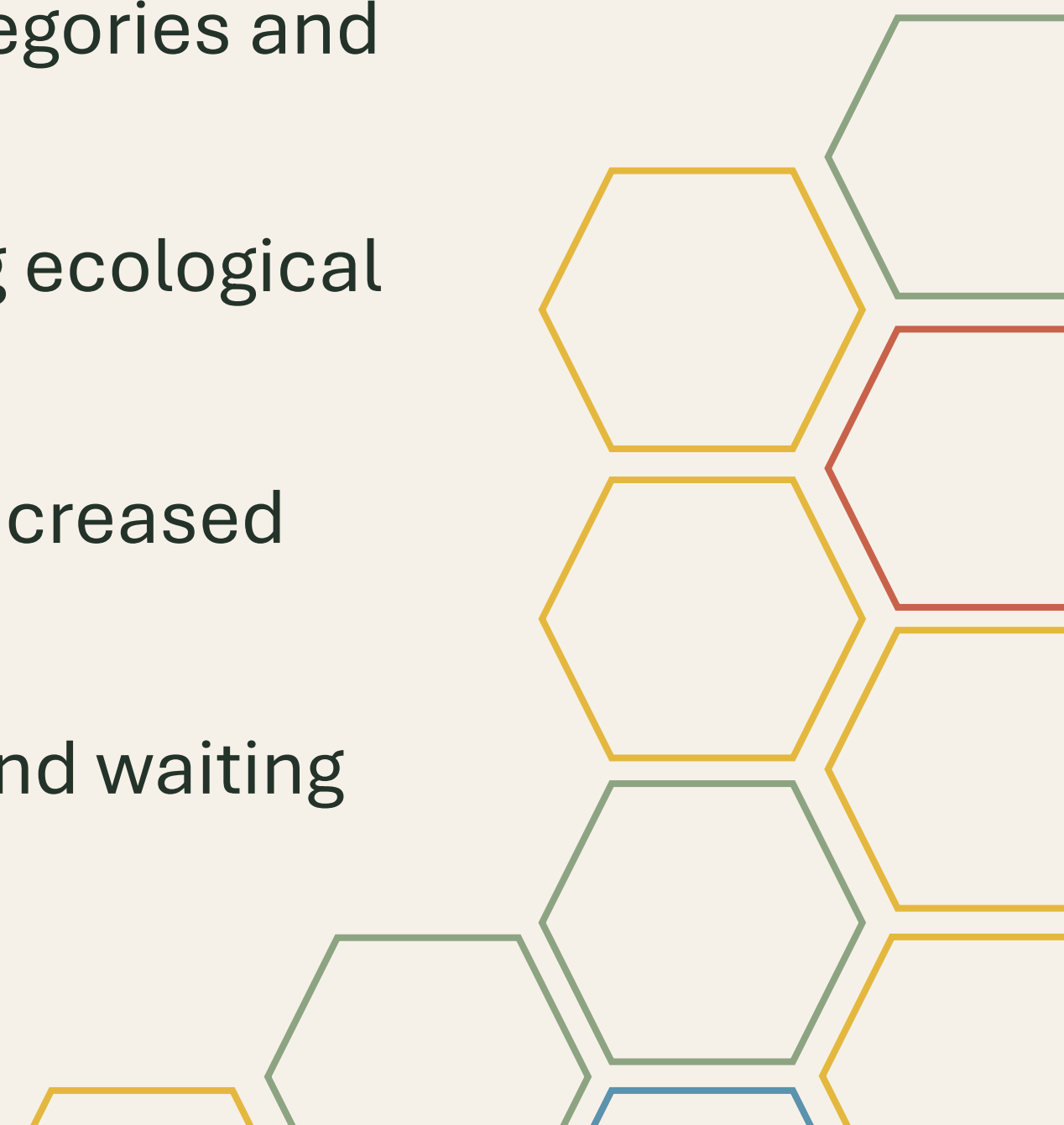
## Observation focus

*Movement · symbols · rules · collaboration · ecological connections · engagement · communication among children*

# Skill gaps identified

The game responded to observed learning needs.

- 1** Collaboration cannot be assumed; it must be intentionally structured.
- 2** Visual references help children connect stories, categories and ecological ideas.
- 3** Children recognized images, but needed help seeing ecological relationships.
- 4** Trial-and-error, repetition and physical interaction increased engagement.
- 5** Peer-supported learning helped children move beyond waiting for adult confirmation.



## Translating gaps into play

Learning goals became concrete game actions.

### Collecting from nature

adaptation + sensory engagement

### Creating a shared map

systems thinking

### Building on another child's move

collaboration + adaptation

### Asking peers about unknown items

communication + confidence

### Changing direction during play

flexibility + problem-solving



*The key shift: skills are not taught separately from play; they are practised through playing.*

# Growing Minds as a tool

A play-based structure for children and teachers.

- Children begin from their real surroundings and natural materials.
- Hexagon pieces help them build a larger ecological map together.
- Themes connect everyday examples to food, water and life on land.



*observe → choose → connect → discuss → adapt*

## Insight 1 – visual supports matter

Symbols and icons helped children move from recognition to conr



- Ecological icons made concepts more concrete.
- Colour systems and image prompts supported conceptual links.
- Visual clarity improved accessibility for young children.

*Children needed simple and tangible symbols that had similar language to focus on systems.*

## **Insight 2 — collaboration must be designed**

Being in a group is not the same as learning collaboratively.

*Shared missions  
turned  
collaboration into a  
visible action.*

- Children had to continue from one another's moves.
- Turn-taking and shared outcomes encouraged peer responsibility.
- Smaller group settings supported autonomy and communication.



## Insight 3 — place changes learning

Outdoor play strengthened sensory engagement and ecological understanding.



*“Children understand systems more clearly when learning is connected to place.”*

- Outdoor activities created curiosity and excitement.
- Children connected natural materials with wider ecological relationships.
- Learning became physical, emotional and social.

# Impact and outcomes for children

The tool supported active, social and embodied environmental learning.

- Agency: children became explorers and co-builders, not passive receivers.
- Peer learning: children asked each other, compared ideas and explained choices.
- Systems thinking: connections between elements became visible through mapping.

*Learning became visible as movement, decision-making, discussion and adaptation.*



# Impact and outcomes for teachers

Growing Minds offers a structured but flexible learning environment.

- Introduces sustainability without relying only on verbal explanation or textbooks.
- Can be adapted to classroom, garden or outdoor learning environments.
- Shifts the teacher from the only source of knowledge to a guide for observation, discussion and reflection.

*Tool for facilitation, not only instruction.*



# Summary

Three takeaways for the conference discussion.

- 1** Children's intuitive actions can reveal what educational tools need to become meaningful.
- 2** Sustainability learning becomes stronger when it is active, sensory, collaborative and place-based.
- 3** Play-based co-design can function as a research method, a design process and a learning framework.

*Growing Minds shows how children can shape both the tool and the educational imagination behind it.*

**Thank you**  
*Questions & discussion*



**Nimet Hüma Sabırlı**  
[nimet-huma.sabirli@besignschool.com](mailto:nimet-huma.sabirli@besignschool.com)