

Proposals for science education in early years: implications for teacher training

José Cantó
(University of Valencia - Spain)



Almudena Marín
(University of Almería – Spain)



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THE ORIGIN OF THE WORK: CONTEXT



Research group: Childhood Stars
Convergence School (0-3) and University

STARTING POINT

Why focus on science in the first years?

A central tension

- Teacher training covers children from birth to six years old.
- Professional preparation often concentrates on older children.
- The first years require specific ways of observing, designing and interpreting learning.

Key message

Scientific processes can begin before formal language, when proposals are adapted to children's ways of acting, sensing and communicating.

PROBLEM

The training gap

Observed bias

Training and examples are frequently oriented towards 4- and 5-year-olds.

Possible causes

The youngest children's actions are subtle, embodied and less verbal.

Research need

There is still limited research and fewer shared classroom references for this age group.

This gap has direct consequences for how future teachers learn to identify science in early childhood.

AIM

Research-based classroom proposals

Aim of this presentation

To present science-based learning activities implemented with 1- and 2-year-olds and discuss what they contribute to initial teacher training.

- Activities designed within a broader research project.
- Collaboration among university researchers, teachers and educators.
- Attention to children's individual characteristics and developmental possibilities.



CONCEPTUAL FRAME

What means “science” at 1 and 2 years old?

Not a simplified version of school science, but an age-sensitive way of engaging with phenomena.



Observe
looking, touching, listening



Act
trying, moving, manipulating



Repeat & vary
checking effects through action



Communicate
gesture, gaze, sound, shared attention

The scientific process is visible in micro-actions: how children explore, compare, anticipate and transform situations.

CLASSROOM EXAMPLE

Proposal 1: Scientific diapers



Why diapers?

- They are familiar objects for children.
- They allow direct exploration of absorption.
- They connect everyday experience with scientific phenomena.
- They invite comparison: dry / wet, light / heavy, empty / full.



Pañales científicos: una situación de aprendizaje contextualizada en el aula de 2 años para trabajar la ciencia

Scientific diapers: a contextualized learning situation in the 2-year-old classroom to work on science

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José Cantó Doménech
Universitat de València, jose.canto@uv.es
ORCID ID: <http://orcid.org/0000-0002-2441-4465>

Almudena Marín Porta
Universitat de València e Inspección de Educación, marin_almpor@gva.es

M. Lluïsa Ortíz Hernández
Escola Infantil de Primer Cicle "El Castell", 46037339@edu.gva.es

José Viana Sánchez
CRA "Oleana", pepe.viana@gmail.com

SCIENTIFIC DIAPERS

What children could explore

Phenomena

- Water absorption
- Change of weight and volume
- Texture transformation
- Cause-effect relations

Actions

- Pouring
- Touching
- Squeezing
- Comparing

Teacher attention

- Observe children's strategies
- Name visible changes
- Offer time and repetition
- Avoid over-directing the task

The object is ordinary; the educational gaze makes the scientific process visible.

CLASSROOM EXAMPLE

Proposal 2: The cardboard city

A designed environment for exploration

- Cardboard boxes as open-ended material.
- Spaces to enter, cross, hide, move and transform.
- Possibilities for bodily, spatial and social exploration.
- Observation of differences between 1- and 2-year-olds.



RESULTS

Differences observed between 1- and 2-year-olds

1-year-olds

- More time for observation and approach.
- Exploration through the body and proximity.
- Need for affective security and adult presence.
- Interest in entering, touching and repeating actions.

2-year-olds

- Greater initiative and autonomy.
- More transformation of materials and spaces.
- Emerging symbolic meanings: houses, tunnels, shelters.
- More visible coordination with peers.

The same proposal reveals different forms of scientific engagement according to age and experience.

TEACHER EDUCATION

Implications for initial teacher training

Future teachers need scientific competencies that are relevant to the first years of life.

1 Design

Create open proposals with accessible, familiar and transformable materials.

2 Observe

Recognise scientific micro-actions beyond verbal explanations.

3 Interpret

Connect children's actions with scientific processes and developmental characteristics.

4 Document

Use records, photos, notes and shared reflection to make learning visible.

5 Guide

Intervene with sensitivity: offer language, time, safety and continuity.

IN CONCLUSION

Science education in early years is possible...

...when teacher training learns to look at children's actions as meaningful scientific processes.

- Start from everyday objects.
- Design environments that invite exploration.
- Observe micro-actions carefully.
- Train future teachers for the whole 0-6 stage.

Thank you!

