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Upbringing through mathematics: a non-utilitarian approach to Arithmetic and Geometry

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Two questions for an open debate:

Study of mathematics for its own sake or concentrate on life skills?
(Faraguer, 2014)

Are we sure they cannot learn more?
(Monari, 2002)

Our hypothesis

Give up to an exclusive utilitarian vision

Focus on the formative value of mathematics

First consequence

Calculation skills are not the curriculum centre

Concentrating on

- Geometry
- Deep understanding of numbers

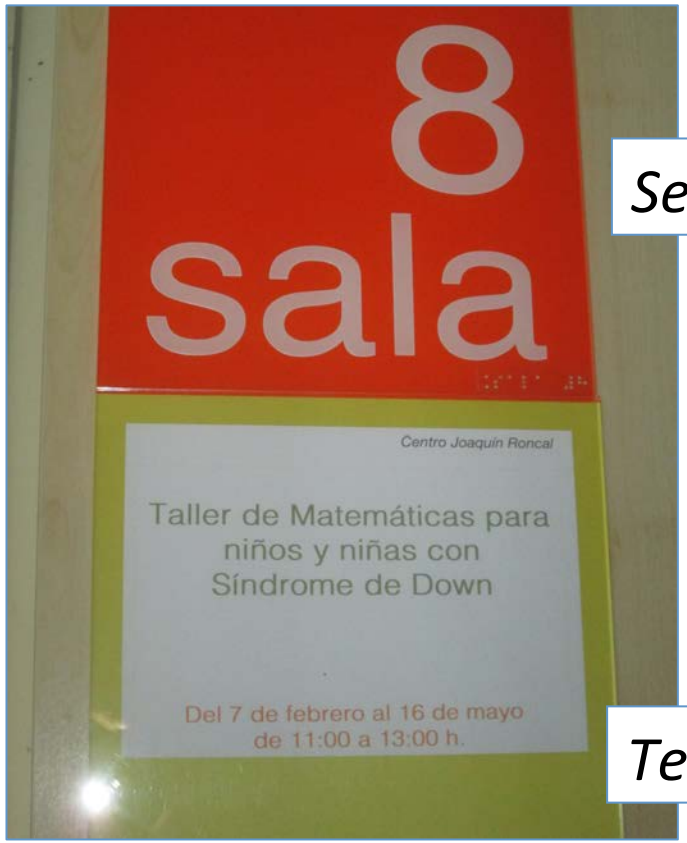
Second consequence

A new approach to first steps in mathematics

- Based upon the foundations of maths
- Integrating geometry and arithmetic

Primitive concepts in Geometry (Hilbert, 1899)	Primitive concepts in Arithmetic (Peano, 1889)
Point	One
Straight	Number
Plane	Successive
To go trough	(To count)
To lie between	
Segment	
Angle	

The experience



Seven children

Teachers' team

Phases of the experience

1. Observation: three sessions

Naive conceptions of number and shape

First description of each child

2. Teaching: six sessions

Geometry

Counting

3. Evaluation: one session

What have they learned?

Final description of each one

Conclusions

Educational means

Mimesis: “as if we were…”

Playing

Learning together

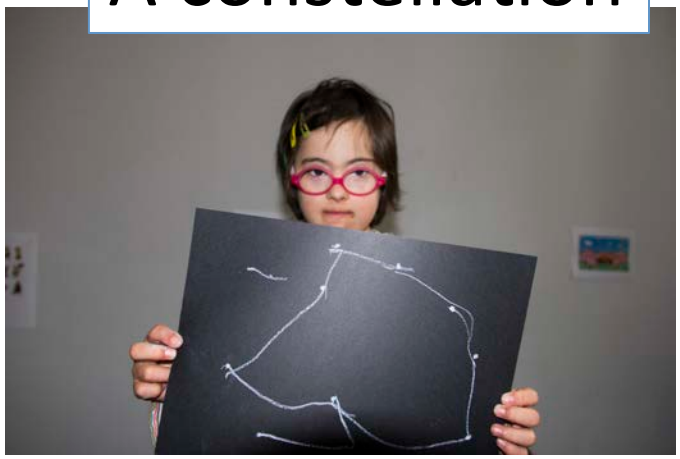
The teacher as a model

Some activities

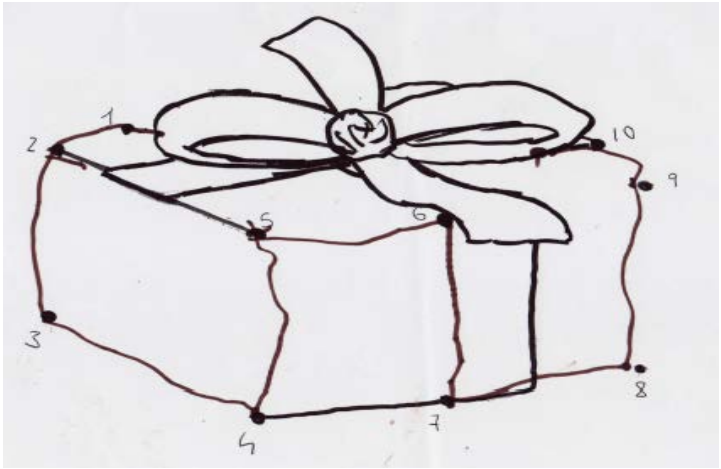
About the point

Painting stars

A constellation



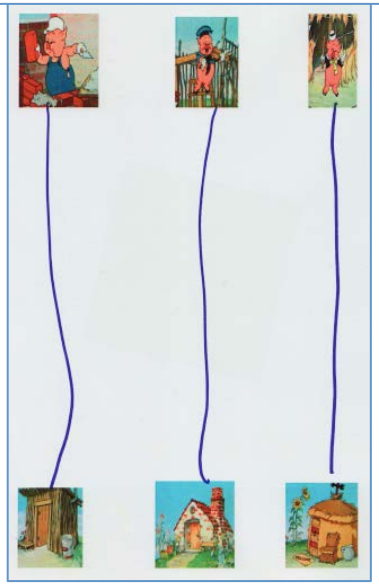
Points and numbers



Segments

Straight line and segments

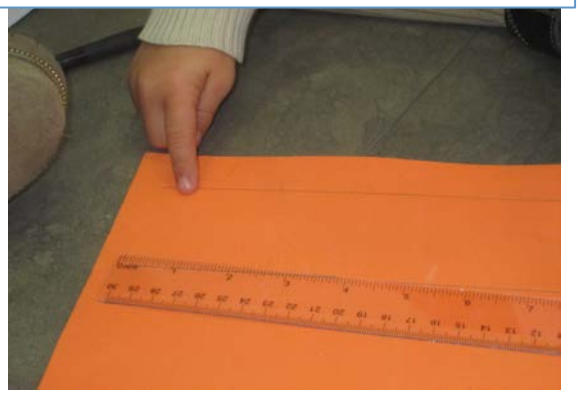
Linking two points



Going ahead

We line up

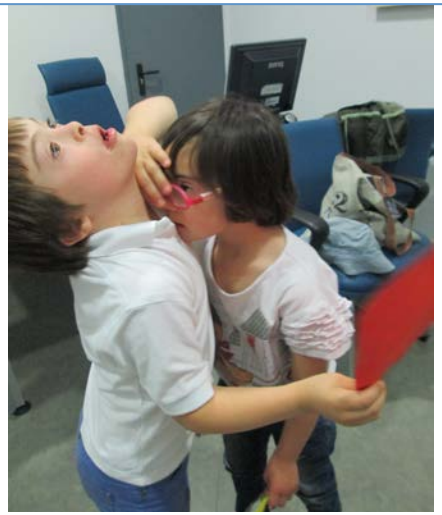
Without bending



The point in common

Comparing… Heights

One to each other



Using the wall

… the length of segments

Two

Three

Four

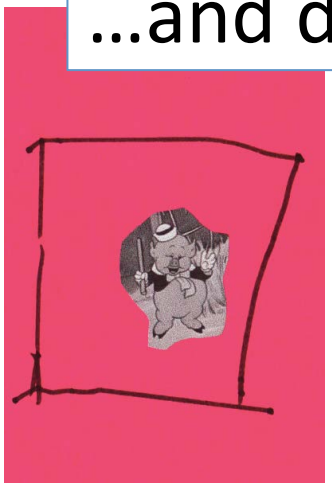
Understanding Quadrilaterals

We travel through them

and get inside

We build…

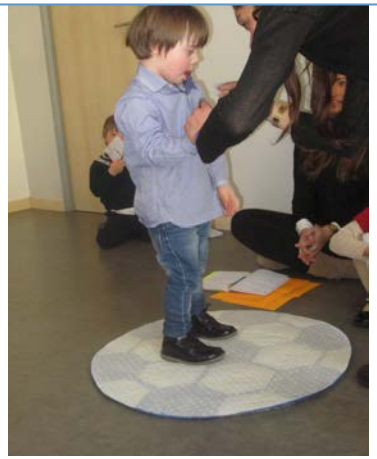
…and draw them



Living the circles

We go around

Stand in the centre



Cross them

We make circles of the same centre

Drive with… and draw them

Similarities among solids

Pilar´s first day…

and her last day

They classified almost all!

Counting

The number one

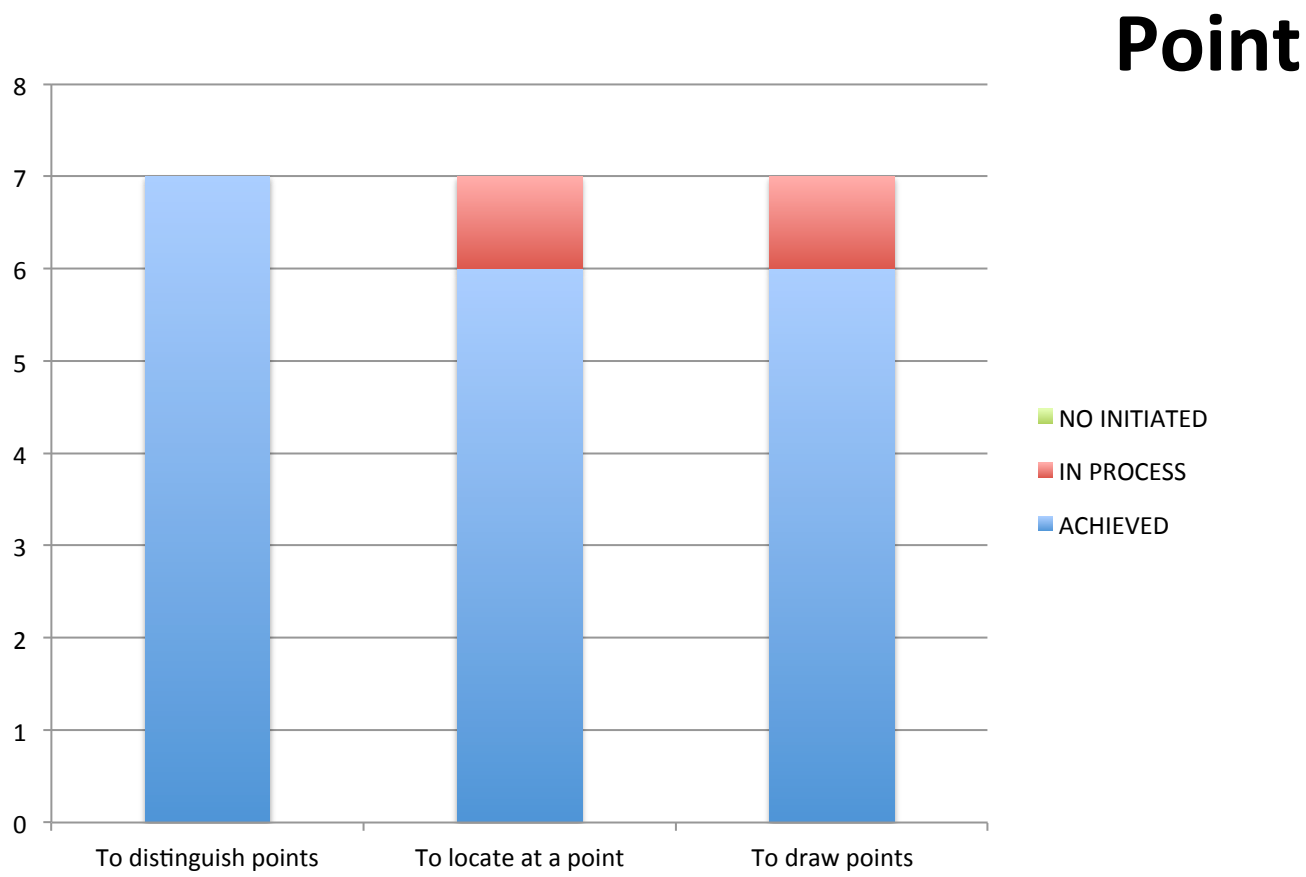
The successive numbers

Using our fingers

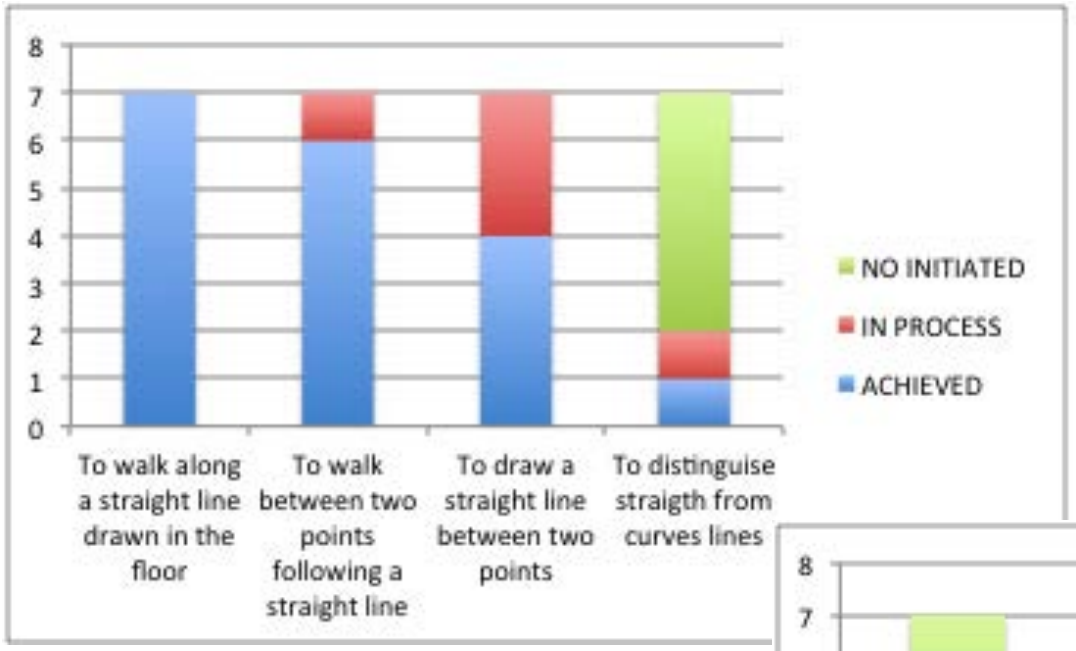
Counting animals… and coins

Some results

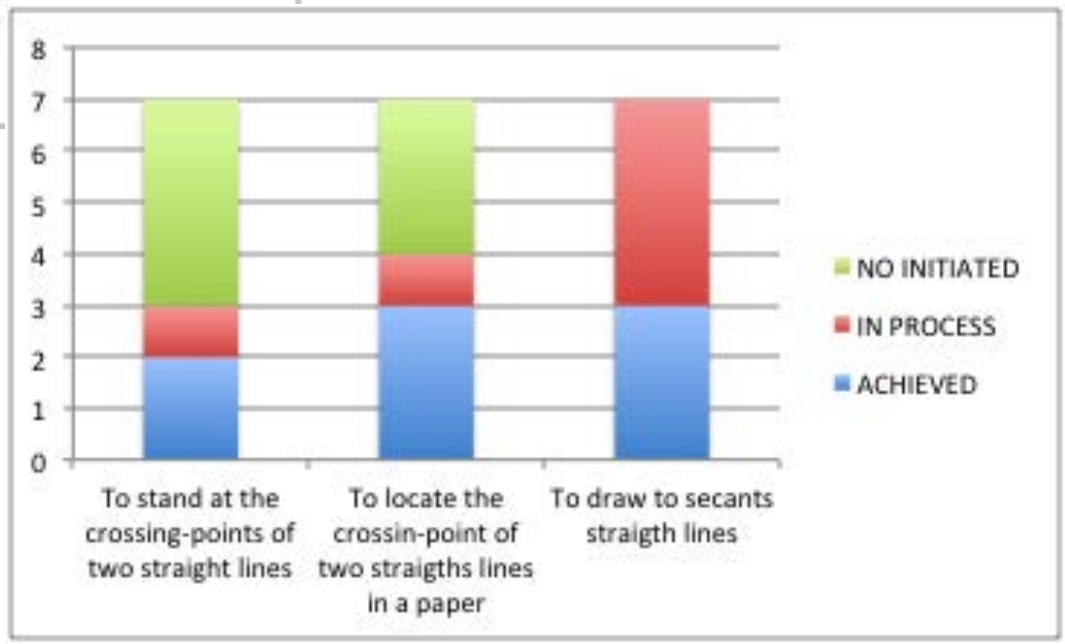
Primitive concepts in geometry



Primitive concepts in geometry

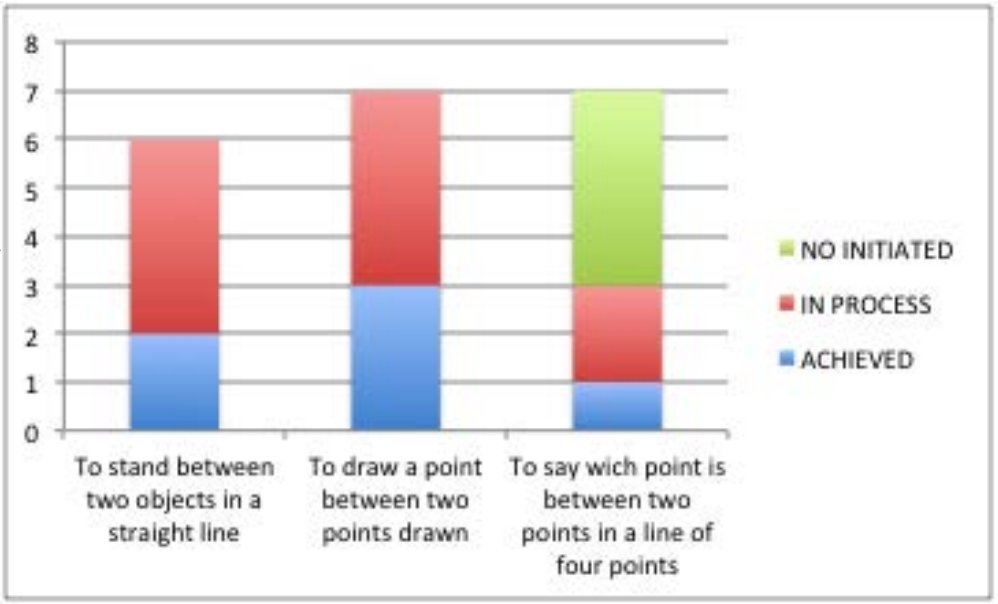


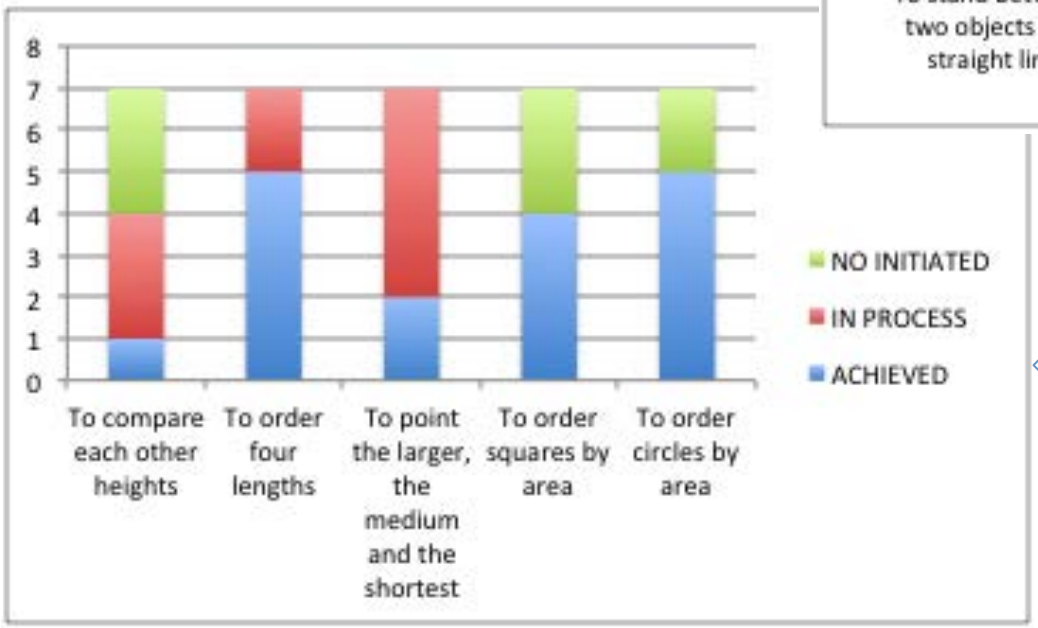
Straight line



Primitive relations in geometry

To be between

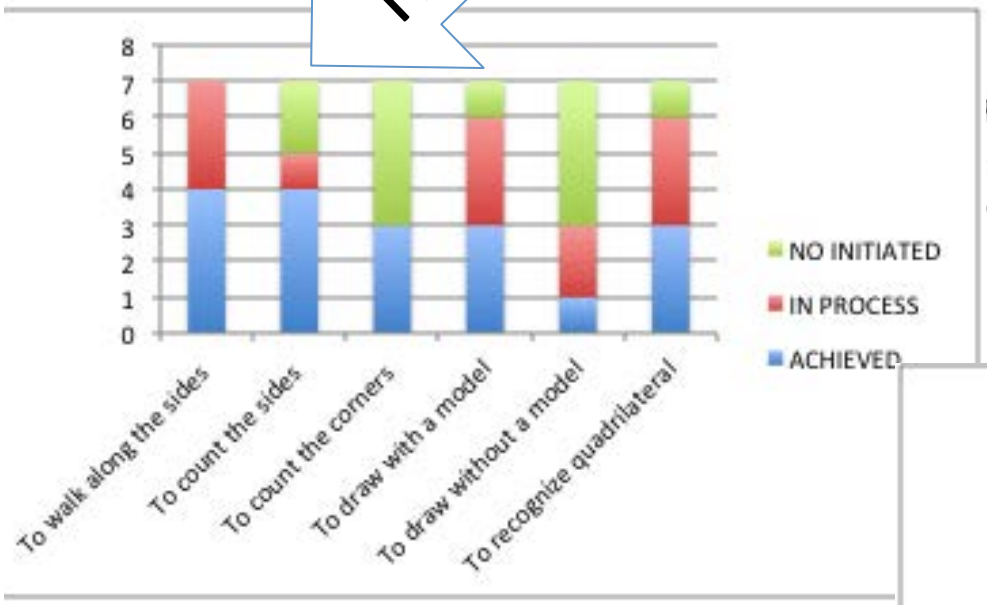




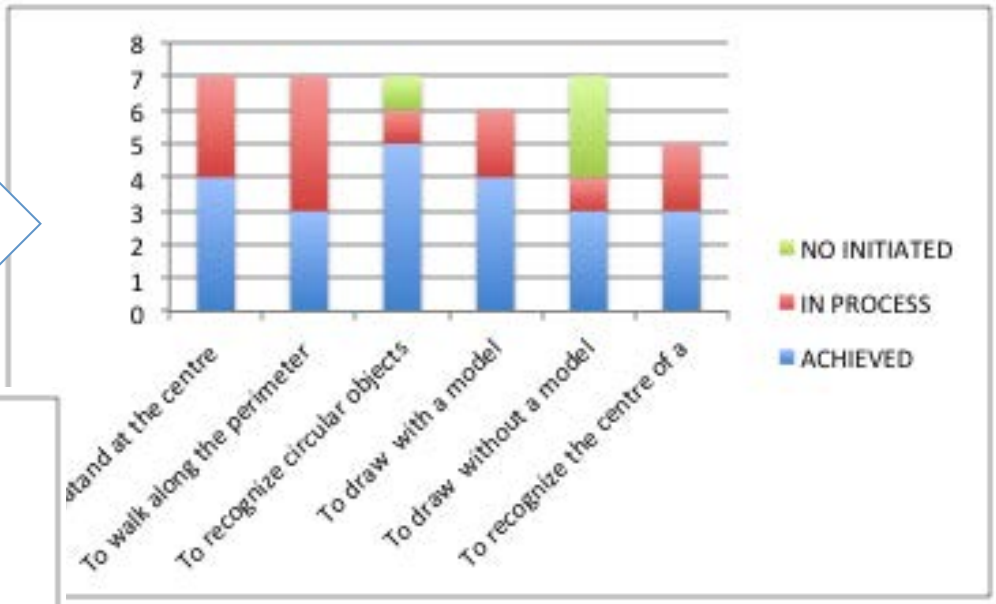
To compare

Plane shapes

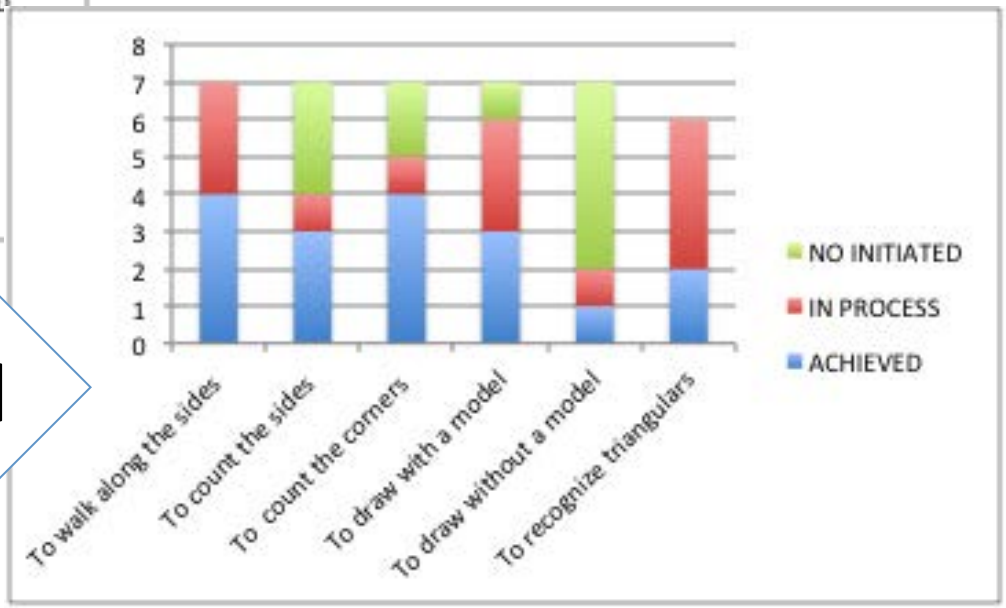
Triangle



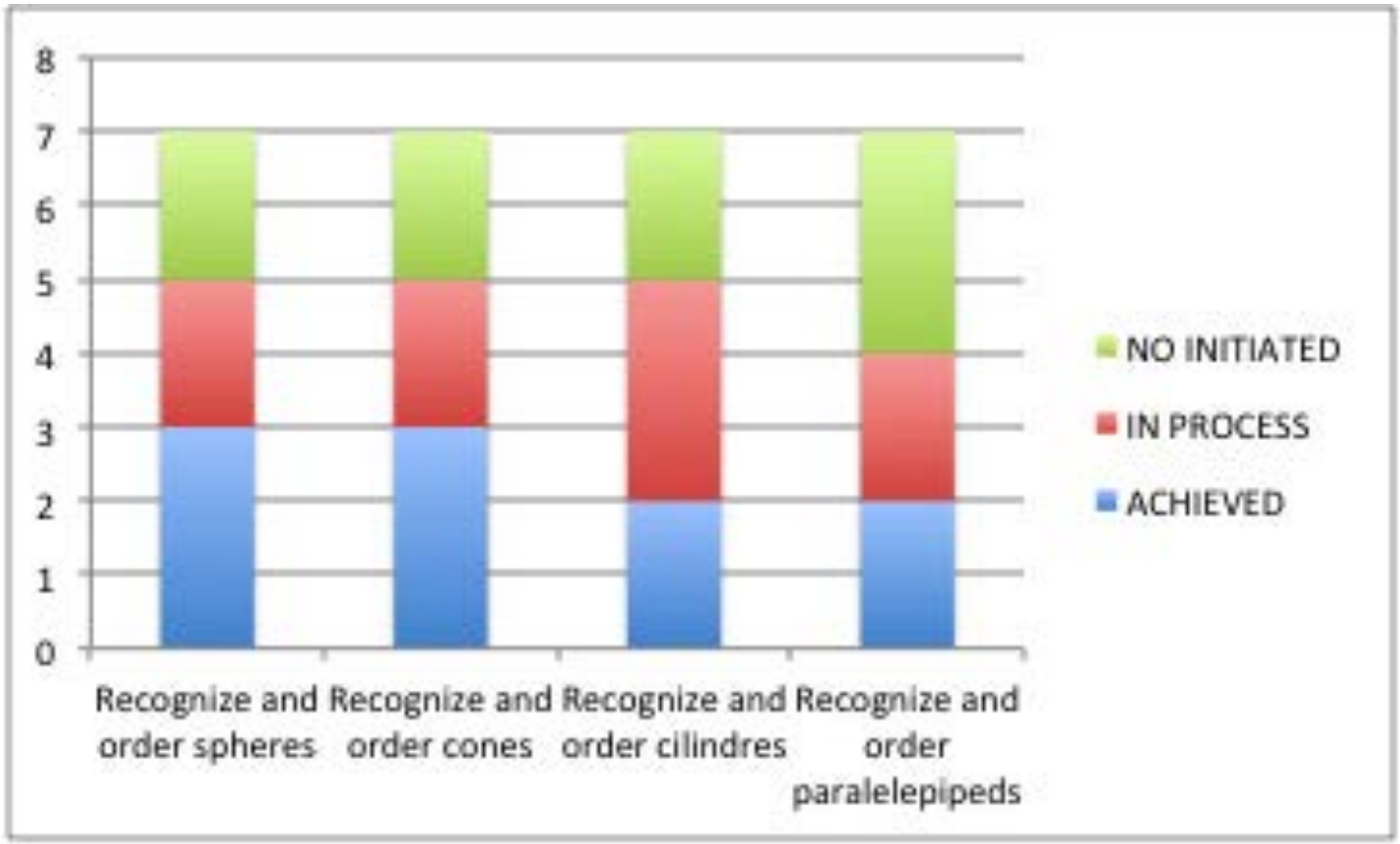
Circle



Quadrilateral



Solids


8
7
6
5
4
3
2
1
0
Recognize and order spheres
Recognize and order cones
Recognize and order cilindres
Recognize and order paralelepipeds
NO INITIATED
IN PROCESS
ACHIEVED

Conclusions

- The deep human roots of mathematics
- All the children have learned
- The older they are the more they have learned
- The lack of expressive language and their delay motor development haven´t been a problem

Success keys

- Mimesis
- Children and adults joy
- Relationship with adults
- Self-recognition

Future

Design of activities to build a symbolic thought with the eldest children

"Maths awake those who have a natural intellectual delay, and turn them willing to learn, with good memory and clever, far away from their natural capacities "

Plato, Laws

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Thanks!... Gracias

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