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*Theme I*

**What and Why of  
Whole Number Arithmetic**

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# Family of theme 1



# Outline:

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1. What and why of WNA as a whole :  
Language/Culture/History dimension
  2. What and why of WNA in classroom  
teaching/learning dimension : Number Senses
  3. What and why of WNA in mutiple communities
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# 1. What and why of WNA as a whole : Language/Culture/History dimension

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Universal  
/Standardizational  
numbers

0,1,2,3,4.....

Non-universal child



# 1. What and why:

## Language/Culture/History dimension

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a Language dimension

b Culture dimension

c History dimension

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# language dimension:

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why : Influence of civilization habits and numeration Civilization imposes number names. In many countries, these names are not directly related to the amount of numeration's units

Regularity vs.non-regularity

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# Language dimension

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What:

1) Content subjects in WNA?  
Relations between contents? -  
numbers (number names,  
positional writing), properties of  
operations, arithmetical signs (=,  
:, ...), algorithms for computation  
in column, mental computation

Why:

There are many (surface level)  
commonalities in how we write  
numbers. Yet, number names,  
symbols, tools are fully implicated  
in how children come to know  
number and quantity. Depending  
on the language it could be more  
or less difficult for children.

The diversity in language and  
history are potential resources for  
thinking differently, to support  
conceptual awareness and

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# Culture and cultural identity dimension

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An invariant factor should be concerned  
The connection is necessary.

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# Historical dimension

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- a) influence of math history on a curriculum ?
    - use of « historical » parts in the curriculum ?
    - use of history of math in math education?
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## 2. What and why of WNA in classroom teaching/learning : Number Senses

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There exist two different conceptions of the concept 'Number Sense'. One has biological roots and the other pedagogical roots. They differ in the context:

### *Biological Number Sense:*

- Number sense starts with having a sense of quantity as an consistent characteristic (invariant) of a collection of objects
  - The sense of quantity is the first step towards cardinality
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## 2. Number Senses (continued)

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*Pedagogical Number Sense* comprises of:

- Foundational understanding and competences that children need to master if they are to be mathematically successful. The literature says there are eight such components.
  - Those flexible number skills that allow people to solve real world problems accurately and with confidence.
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# 3. What and why of WNA in multiple communities

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- The cultural communities in which children learn both enable and constrain the 'what' of WNA (goals) and the 'why' of WNA (assumed importance/essentiality of goals).
  - There are multiple (potentially conflicting) voices contributing to the what and why of WNA including teachers, mathematicians, mathematics educators/researchers, and the public (particularly parents). Open dialogue is essential for growth in understanding; yet, difficult to do.
  - Each voice in the community speaks from a position of (often implicit or unacknowledged) history and culture.
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## 3. Communities (continued)

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Two cases of bridging communities were reported:

- Math education researchers carefully listening to the community's "math wrath" in an attempt to understand, recognize shared concerns, and reach shared understandings
  - University mathematicians conducting professional development for in-service teachers, learning from and with each other in order to gain a deeper shared understanding of primary school mathematics and its teaching
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Thank you!

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