

## Title of Paper:

The importance of physical analogue clock in mediating learning of analogue clock time in Grade 4 learners



# Learning Analogue Clock Time

- E.C. Provincial ANA gr. 3(2012) report 38.3 % of learners had correct response in time-related questions
- CAPS (2011) Intermediate Phase learners' taught in ad hoc way through the year – 6 hours teaching time for whole year
- CAPS suggests skills to be acquired (grade 4):
  - Reading & telling time use clocks and watches
  - Solve time interval problems in minutes & hours
- **CAPS is silent on how to teach time in school**

# 1. Availability of the clock extends the mental range

❖ Physical clock as human tool extends the mental range for later internalisation (Bartolini-Bussi & Mariotti , 2008)

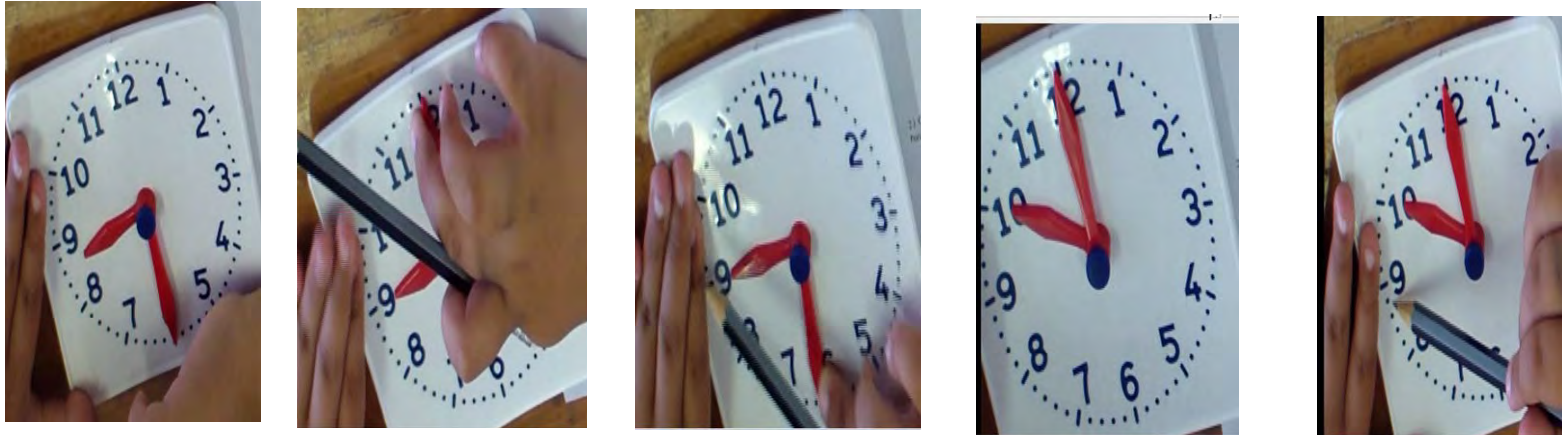
□ Example in video-taped teaching experiment:

- ✓ Learner calculate the duration of time
- ✓ Learner solve interval problems in hours & minutes

# EXTENDS THE MENTAL RANGE

## Excerpt 1: Problem solving (translation)

- ❖ **Question 2:** We leave the house at about 8 30 the morning and arrive at 10 o'clock in Port Elizabeth. How long did we travel to Port Elizabeth?
- **Learner J (pointing):** Sir, how much is this?
- **Teacher:** 8 30
- **Learner J:** 8 30
- **Learner J:** So it is 30 minute to eight?
- **Learner J:** Past eight?
- **Learner J:** Jo I need a clock for this one
- **Teacher:** Huh?
- **Learner J:** I need a clock here



Teacher: How did you do it ? [Get 2 hours] Tell us.

**Learner J:** Sir, I counted from here eight than I come to nine hours, sir. Then I go around and around ...

Teacher: With what did you go around?

**Learner J:** With the long hand, sir ... than I come to twelve [long hand]... than the short hand come to ten and I see two hours, sir

Teacher: You got 2 hours ... ok ... are you happy?

**Learner J:** Yes

## 2. Clock mediates externalising

- Availability of clock mediates externalising the process of perceiving time in the iconic representation
- ❖ Example in video-taped teaching experiment:
  - ✓ Clock enable mental activity to become externalised thus observable , concrete
  - ✓ Clements & Bright (2003) the measurement of time cannot be taught to children by simply teaching them to read clocks because it involves a social convention (conventional).

# USE PHYSICAL CLOCK TO JUSTIFY REASONING

## Excerpt 2: Learner C use the physical clock to argue her position

- T (show picture clock: 20 minutes past 2): What is the time now ?
- **Learner C:** 40 minutes, no wait 20 minute past two
- **Learner Z:** 15 minute
- T: Show it on the clock
- **Learner C (aloud):** 20 minutes past two ... 20 minutes past two
- **Learner Z:** 20 minute past two
- T: Is it?
- **Learner Z (eager):** Yes
- T: 20 minutes you say
- T: Lets look at your clocks
- **C (show to clock):** When long hand is at four than it's 20
- T: How do you say Z?
- **Learner C (interrupts):** Yours (Z) is at three than it's 15



- ❖ The use of the physical clock support counting correct units e.g. minutes.
- ❖ Also enable learners to compare concrete setting with the iconic representation and modify conjectures
- ❖ Physical clock is powerful and enable meaningful communication

# Literature

- Studies express time is complex & multifaceted concept (Burny, Valcke & , Desoete, 2009)
- Abstract nature of time – more elusive cannot go back to see & touch; absence of concrete representation
- Telling analogue time complex require mediation using concrete and physical clock (Friedman & Laycock, 1989)
- ❖ Involves storage of associative time names
- ❖ Retrieval process to read the displayed configurations
- ❖ Bi-dimensional thinking to interpret and make meaning of each of the two hands (hour & minute) in motion



# My Theoretical Framework

- Vygotsky's socio-cultural framework views:
  - ... that human activities take place in cultural contexts and are mediated by language and other symbol systems (Vygotsky, 1978)
  - ... the interaction between the individual and the real world is controlled and transformed by the use of symbolic material, cultural tools, in this case the analogue clock (John-Steiner & Mahn, 1996; Lerman, 2001)
  - Unit of analysis in my research is tool mediation, which looks at how the physical analogue clock may enable or constrain children's sense of clock time (Hedegaard, 2001).
  - Tool mediates support in shaping and constructing analogue clock time knowledge from a social to a psychological level to make meaning of clock time (Bartolini-Bussi & Mariotti, 2008)

# Conclusion

An explorative, interpretive case study – sample of gr. 4 (n= 38) learners teaching intervention programme – use physical analogue clock

- ❖ The **clock** as a social artifact contributes to the **internalisation of mediation** beyond a **practical** level to the **cognitive level** (Bartolini-Bussi & Mariotti, 2008)
- ❖ The clock both support calculating the passing of time and **mediate sense making** of the concept of time
- ❖ The clock is an important tool in **mediating learning** analogue clock time (as oppose to iconic representation)

# Thought for today

- ... the power of the hour clock that applies even today, namely that “the hours are made for man and not man for the hours!”  
(Whitrow, 1988, p. 114)



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