



Math episodes and classroom interaction –

A comparative case study of formal
learning environments for six-year-olds

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Introduction

- This study reports how multiple theoretical aspects of teacher-pupil classroom interaction styles (based Pollard 1997;2006; Berk & Winsler, 1997) appear in the math lesson episodes (application of Sfard & Kieran 2001)of formal learning environments for six-year-old pupils in European samples. It takes a closer look at possible quite common types of classroom interaction dimensions.
- This research is an international, comparative, cross-sectional case study, which investigates features of process- oriented routes pupils use for learning in formal learning environments. The focus of this study is on group level classroom interaction research, based on a socio-cultural perspective.



The aim of the study, data and participants


- The aim of the study is to investigate how teacher-, shared interaction and learner oriented classroom interaction dimensions appear in the implemented math lesson episodes (N=371, n=79-127/sample).
- The analyze is based on video-observations of all math lessons during one study week from each pre- and primary school sample (total 886 min data of MPEG video files, M 2.02 min./episode).
- The participants are samples of 6.5 year old learners from kindergarten (sample Pre1-3) and first grade of primary school (sample Sch1) from Finland, second grade of infant school (sample Sch2) from England and preschool in primary school (sample Sch3) from Sweden.



Classroom interaction is rated on seven structures of interaction behavioral profiles (*Hiltunen 2003) & three dimensions (Pollard,1997:2006)

- Teacher-oriented (TO, code 3) teacher orientation (BE) meaning traditional teaching and instruction.
- Teacher-group (TG, code 2) teacher orientation (BE) meaning questions and answers, correction and assessment.
- Teacher-pupil (TP, code 1) shared interaction (SC) meaning teacher interacting with one pupil.
- Dis/organized (code 0) meaning transition periods or chatting off-task nothing else than math.
- Pupil-pupil (PP, code -1) shared interaction (SC)_meaning 2-3 pupils interacting together.
- Pupil's independent (PI, code -2) learner orientation (CO) meaning pupil's independent work.
- Pupil-oriented (PO, code -3) learner orientation (CO) meaning projects, themes etc. by pupils in group

Minute for minute analyze. (*Reliability .75 of 10% MPEG)



Math episode –concept, mathematical classroom conversation unit consist of

- **A** Pre-engagement means problem orientation, for pupils to be preoccupied with their own thoughts.
- **B** Engagement means conversation about the solutions.
- **C** Disengagement means written answers and possible translations.

On object-level and meta-level.

(Sfard & Kieran, 2001).

Methods for analyzing episodes & classroom interaction

Analyze unit

- One math episode last shorter or longer time depending on the quality and quantity of interaction in the zone of pre-engagement, engagement and disengagement.
- In classroom interaction profiles and dimension the analyze unit was 1 min.

Results refer to

- Classroom interaction profiles (FIG. 1.), dimensions and main dimensional styles (TABLE 1.)
- Math episodes and lessons (TABLE 2.) Pure (BE, SC & CO) and mixed (BE+SC, BE+CO & SC+CO) classroom interaction styled math episodes (TABLE 3.)

A video and an example of a qualitative analyze of the math **episode 199 (Sch2)** will be presented in Fig. 2.



Results

FIGURE 1. Mean percent of classroom interaction profiles in all samples.

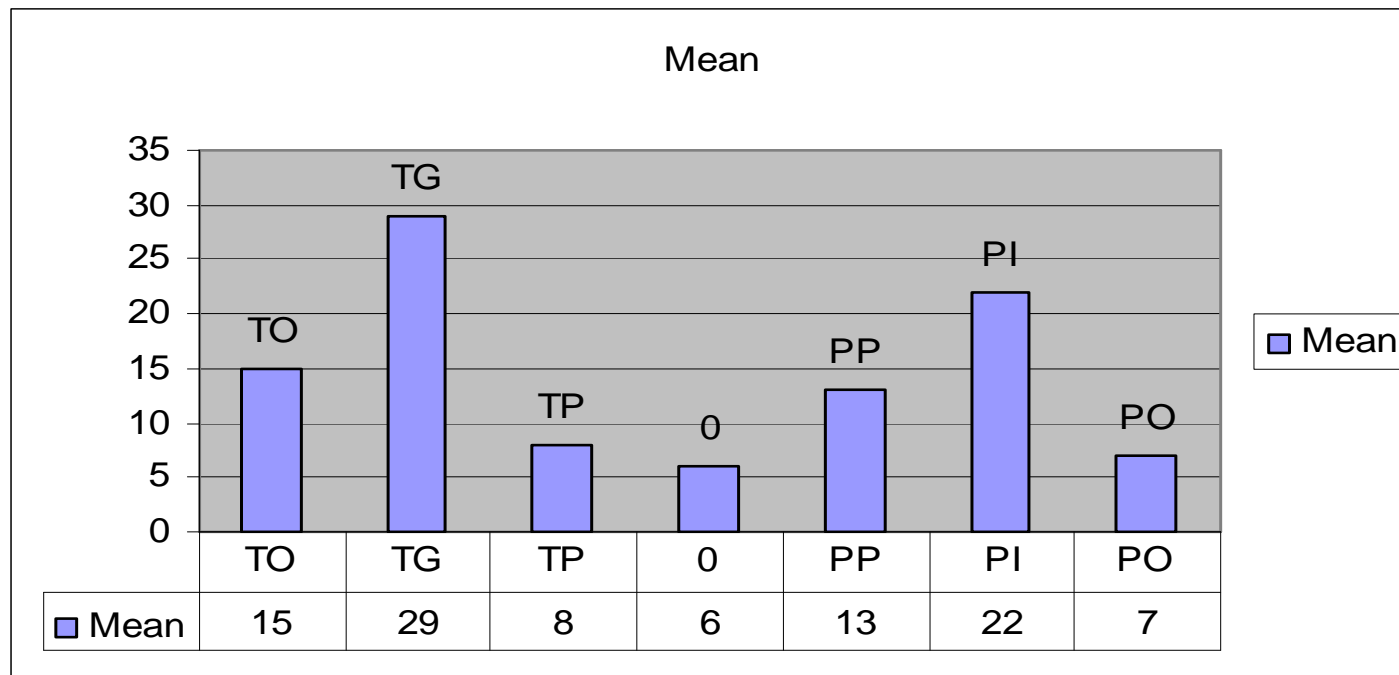




TABLE 1 . Mean percent of classroom interaction,
(886 min MPEG files).

DIMENSIONS of all samples:

- 44% of teacher orientation
- 29% of learner orientation
- 21% of shared interaction
- 6% off-task behaviour

Analyzed minute
for minute!

Comparison of main dimensional STYLES:

PRE 1-3	45% SC
SCH1	48% BE
SCH2	66% BE
SCH3	49% CO

TABLE 2. Math lessons and episodes

<i>Duration/episode</i>	<i>TOTAL</i>	<i>Pre1-3</i>	<i>Sch1</i>	<i>Sch2</i>	<i>Sch3(pre)</i>
Duration MPEG files*	886 min	249 min	260 min	210 min	167 min
Lessons M á	55 min	62 min	52 min	53 min	56 min
Episodes (N)	371	85	79	127	80
Duration / episode (M)	2.02 min	2.93min	3.29 min	1.62min	2.09 min

•MPEG files/math lessons with two digi video cameras (total 1600min<)



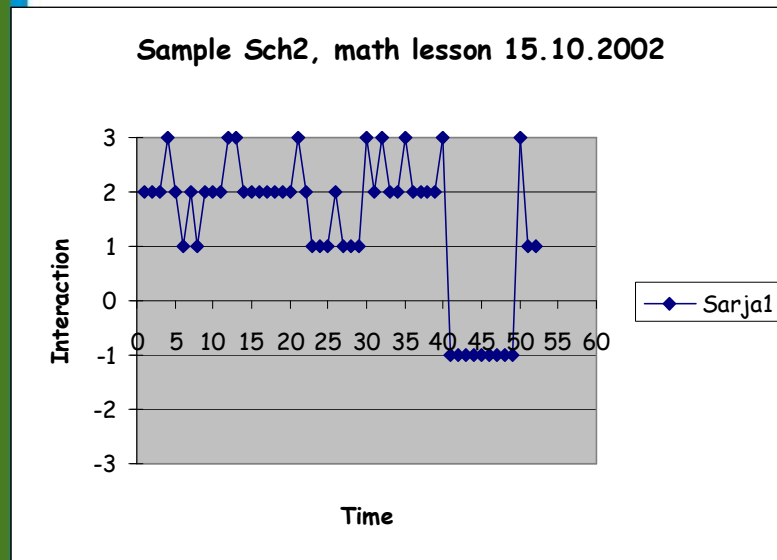


TABLE 3. N & M (min) of classroom interaction profiled to pure and mixed episode styles.

	N	M (Min)	SD	SE
Style				
BE	203	1,1186	1,57939	,11085
SC	7	6,9571	4,12473	1,55900
CO	24	8,1329	6,55474	1,33798
BE+SC	117	1,2868	1,64106	,15172
BE+CO	14	5,1664	4,61583	1,23363
SC+CO	6	9,5467	6,74309	2,75285
Total	371	2,0246	3,36302	,17460

Figure 2. An example of mixed teacheroriented and shared interaction styled math episode in classroom

Sch 2 Episode 199 BE+SC*
(time 23.10-23.50) ‘



- A Pre-engagement Ope "Let´s try 40 add 9, it´s quite easy of doing this, if you do it that way, I think, but we´ll see. Let´make it easy, what´s 40 add 10?(name) 40 add 10. (repeat and another name)?
- B Engagement Opi"50" Ope "Right and take away 1 (same name*)?" Opi "59" Ope "No, that´s adding another 9 (other name?)" Opi "49"
- C Disengagement Ope " 49, well done (name)! “

Episode 199 sample Sch2 15.10.02

Episode.mpg



18.12.2007



Conclusions

Minute for minute analyzed classroom interaction referred to **teacher oriented (44%), shared interaction (21%), learner oriented (29%) dimensions and only 6% off-task** behavior during math lessons in all these samples.

Main interaction dimensional STYLES refer mainly to SC (45%) at sample PRE1-2, to BE (48%) at SCH1, to BE (66%) at SCH2 and to CO (49%) at SCH3.

Episode for episode analyze refers mainly to **pure BE (55%) & mixed BE+SC (31%)** and only slightly to **pure CO (6,5%) & SC (2%)** and **mixed BE+CO (4%) & SC+CO (1,5%)** **classroom interaction styles** of implemented math episodes (N=371)

