NTNU
Kunnskap for en bedre verden

Preliminary findings from LaUDiM

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Celebration of Geir's 70th birthday

LaUDiM – intervention project supported by FiNNUT

Intervention project together with elementary schools where we explore and develop teaching and learning in mathematics.

- → Develop knowledge on how the learning environment in the early years of elementary school influence development of pupils abilities to express mathematical concepts and mathematical ideas.
- → Explore teachers professional development using video recordings.

→Explore student teachers learning of mathematical whole class discussions using video recordings.

Reason for intervening in the practice field of teacher education

Productive mathematical discussion:

Discussion where the pupils can reason in mathematics and where they develop a deep understanding for mathematical concepts.

- To listen to and interpret pupils mathematical ideas is demanding (Chamberlin, 2005)
- To stimulate pupils thinking by asking questions is a complex skill which demands good planning (Manoucheri & Lapp, 2003)
- Student teachers ask few follow-up questions and give the pupils little time to explain their answers (Henning & Lockhart, 2003)
- Student teachers have difficulties responding to unexpected responses from the pupils (Nilssen, 1995)

The intervention

Planning session
With two mentors

Mathematical discussions in the classrom

Video supported post-lesson mentoring session

Why video as a learning tool?

- Joint video analysis/discussions develop teachers ability to focus on the pupils thinking and learning

  (Coles, 2013; Sherin, 2004)

- When discussions are based on video recording teachers tend to talk in a more focused, deepened and analytic way about teaching and learning

  (Borko mfl., 2008; Coles, 2013).

- Video sessions give teachers time and new opportunities to notice and explore patterns of interaction in mathematical dialogues

  (Sherin & van Es, 2005).

Research question

How can the intervention raise the student teachers awareness of qualities and challenges in productive mathematical discussions?

Data material

- Transcribed video recordings from 4 mathematical discussions between one of the student teachers and a class of third graders
- Transcribed video recordings from pre- and post-lesson mentoring sessions where the mathematical discussions were the topic. Participants here: four student teachers and two mentors (one teacher and one mathematics teacher educator)
- Logs written daily by 4 student teachers during the five weeks of student teaching.
- Notes written by observing researchers from pre- and post-lesson mentoring sessions.

Analysis

Inductive analysis inspired by the constant comparative method (Strauss & Corbin, 1998)

- Tools in the analysis: questions, comparisons, tables.

- Sequenced the classroom discussions.
- Coded the dialogues with single or pairs of pupils by open coding.
- Identified and compared challenges across all dialogues concerning time to think, follow-up questions and interpretation of pupils responses.
- Analysed the video-based post-lesson mentoring sessions based on when the video was stopped and what the topic in the discussion was.

- Compared findings in the classroom discussions with utterances in pre- and post-lesson mentoring sessions and the logs.

Findings

The analysis shows that both the student teachers and the mentors interpreting and representing the pupils thinking as a key challenge.

There were 3 interrelated categories:

- Predict
- Choose
- Represent

From Ann’s log after observing a mathematics lesson (not given by her mentor)

«At the same time I missed some of the talk moves we have learned that promote matematization.»

- Building on what the pupils say
- Make other pupils repeat
- Make sure everyone has enough time to think
- Pair talk

«Here I missed a more deliberate use of the board.»

Books in the teachers' office

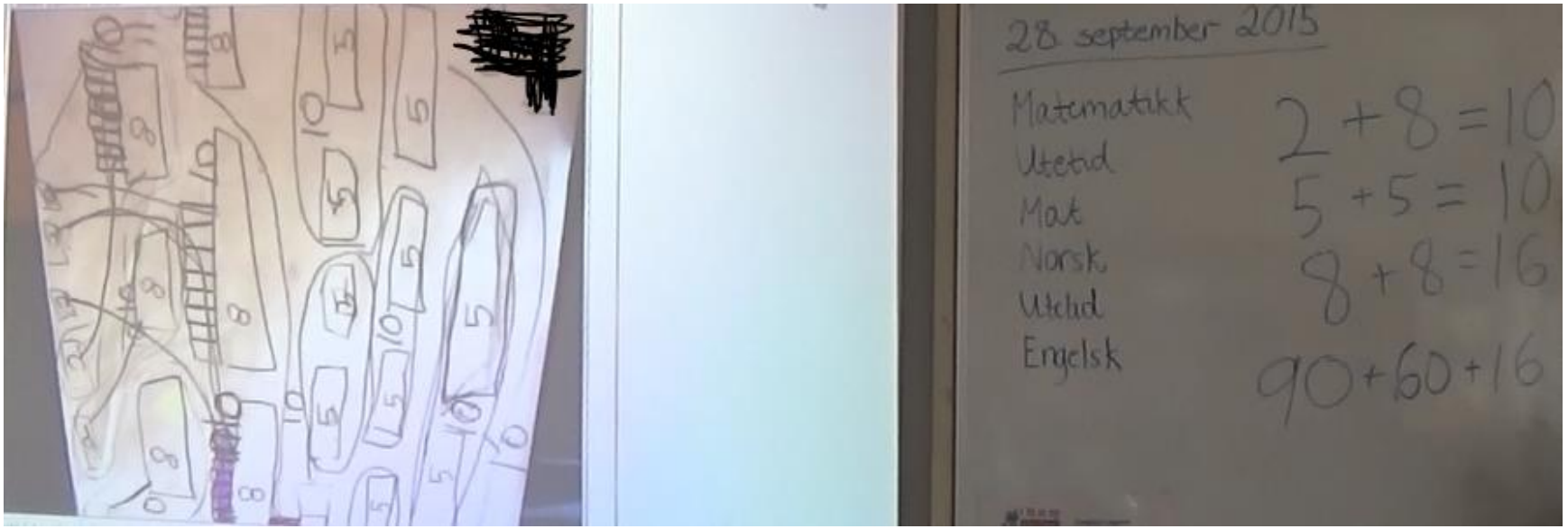
The teachers have many books in the office. They are stored in many boxes. There are 7 boxes with 2 books in each. There are 9 boxes with 8 books in each. There are 12 boxes with 5 books in each. How can the teachers find out how many books they have all together? Show your thinking so that the others in your class can understand.

In focus in the planning session

- Discussed how to adapt the task for pupils finishing fast.
- The focus in the discussion will be what groupings the pupils made
- Need to think about the sequencing, what do we want to hear first and last?
- How do they show the work to the rest of the class?
- Other pupils need to repeat

Picture of the girls' solution

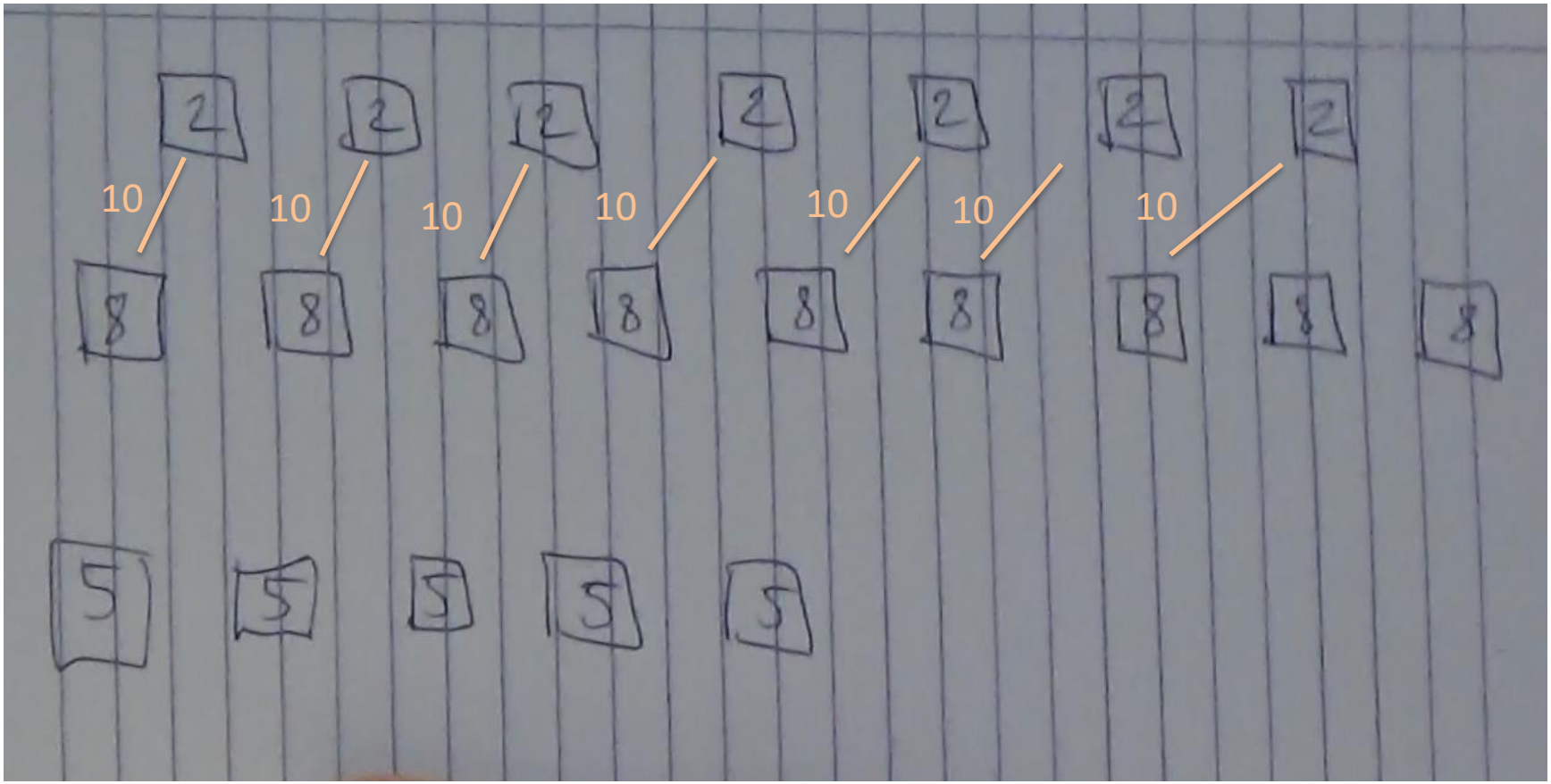
Written on the board



Ann’s log after classroom discussion

«Even though I was well prepared I would have done a lot differently if I was doing the same again tomorrow. It was difficult to know what to focus on. I felt that I ended up going through what all of them had done without a clear goal and purpose. In stead of letting three groups present everything they had done, I would have let them present parts of their work. It would probably have been enough if group 1 had shown what they did to find out how much 9 boxes with 8 in each was. Maybe group 2 could show that they combined 5 and 5 to make 10s. Group three could have shown how they made 10s from 8s and 2s. If there was still some time left someone could have shown how they found the final answer. It didn’t work well to look at everything.»

Post-lesson mentoring session



Ann’s log after the post-lesson mentoring session

«Seeing myself on film was not as bad as I had expected. It made the post-lesson mentoring very efficient and very instructive. We could easily go into a situation and look concretely on that. By looking at the video we all had the same starting point for the discussion. We could discuss specific things pupils said in a very different way than if we had to try to remember what the pupil had said. It was also easier to discuss how we could have used the smart board differently when we saw it on the video.»

«We have used a lot of time planning a short lesson, but I think we learn much more from this than from planning many lessons superficially.»

Dicussion

- To represent the idea in a way that the pupil recognices – and thereby confirm the pupils thinking – takes a lot of planning. It is important to be able to *predict* possible answers.
- To represent the pupils' thinking in the whole class discussion in a way that can develop the other pupils' understanding the teacher needs to be able to select which strategies to present and in which order.

- The teacher as an interpreter
  - Understand
  - Translate

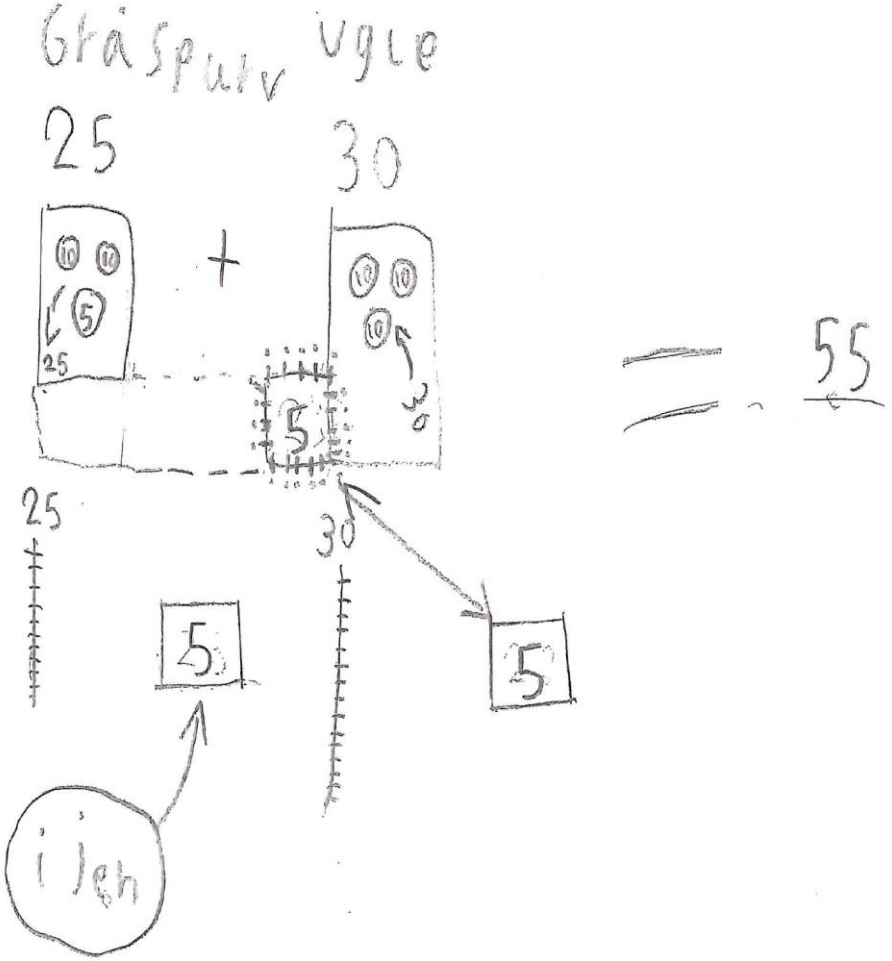
Links to ‘Contingency’ ?

Knowledge-in-*inter*action as revealed by the ability of the teacher to ‘think on her feet’ and respond appropriately to the contributions made by her students during a teaching episode.

- Responding to children’s ideas
- Use of opportunities
- Deviation from agenda

(Rowland, Huckstep & Thwaites, 2005).

What is the difference in the wingspan of the owl and the sparrow?



«I see more and more that being a mathematics teacher in the first year of elementary school has to be at least as difficult as being in the third year in upper secondary school.»

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Ryan, Jonathon (2012) *Importance of researching teachers' beliefs and practices: Stimulated recall.* In: Culturally Responsive Research and Pedagogy Symposium 2012, 13-15 November, 2012, Hamilton, New Zealand. (Unpublished)

Sherin, M.G. & van Es, E.A. (2005). Using video to support teachers' ability to notice classroom interactions. *Journal of Technology and Teacher Education, 13*(3), 475-491.