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Kindergarten teachers' knowledge in and for interpreting students' productions on measurement

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One of the core aspects of teachers' practice grounds (at least should) on the need to interpret students' productions and comments, not only for helping pupils to overcome their possible difficulties, misunderstandings or explore alternative approaches but also to (re)design the teaching approaches having such aspects as a starting point. Such knowledge required in and for interpreting students' productions has been termed as Interpretative Knowledge – IK (Jakobsen, Ribeiro, & Mellone, 2014). The IK is perceived as the knowledge that allows teachers to “give sense to pupils' answers, in particular to ‘non-standard’ ones, i.e., adequate answers that differ from those teachers would give or expect, or answers that contain errors” (Mellone, Tortora, Jakobsen, & Ribeiro, 2017, p. 2949).

Such IK needs to be (and it is desirable it is) developed in the context of teacher education, since it does not developed merely with teaching experience (Mellone et al., 2017). Such development requires to explore, in the context of teacher education, tasks specifically conceptualised to such aim¹. One of the perspectives included in the tasks conceptualised for teacher education is related to teachers' anticipation of student's responses, a process associated with accessing teacher's *space of solutions* (Di Martino, Mellone, Minichini, & Ribeiro, 2016). Essentially, IK is related to the teacher's Mathematical Knowledge (MK) evoked when analyzing a student's production– which does not exclude his/her Pedagogical Content Knowledge (PCK) in this process. Moreover, anticipating student's responses plays a central role on the process of developing the IK, and it is also related to teacher's MK and PCK, as this capacity of anticipation depends, among other aspects, on his/her knowledge of different procedures associated to a concept, and students difficulties and facilities related to a mathematical topic. Besides, anticipating student's responses is associated with the feedback teachers would provide to students, that is, the set of decisions to be taken in order to implement significant mathematical practices. Amongst the mathematical topics teachers need to cover, measurement assumes (or it should) a major role since it is a core construct of mathematical learning, as it serves as a “bridge between the two critical domains of geometry and numbers” (Clements & Sarama, 2007, p. 517) and research shows that early cognitive foundations are not limited to number concepts. With such a core role in students' understanding, measurement is one of the topics needed to be explored with pupils since kindergarten—in order to allow them to start grounding their mathematical understanding and knowledge since early age.

¹ For more information on such tasks conceptualisation see, for example, Policaastro, Mellone, Ribeiro and Fiorentini (submitted).

The content and nature of teachers' knowledge shape the learning opportunities provided to pupils (Hiebert & Grouws, 2007), and researches focusing on kindergarten teachers' knowledge on measurement and its impact on students' performance (Grossman, 2010) is scarce. In that sense, we assume as one of the foci of attention in the research we are developing, the role of such knowledge in supporting (or inhibiting) the development of pupils' mathematical knowledge. In the context of a broader research project (in a continuous professional development context) we have been working with five kindergarten and primary teachers focusing on discussing some tasks with students' productions (aimed at improving their IK) in the scope of measurement. In a posterior moment the group prepare, discuss and implement tasks in their classrooms and afterwards a process of reflection upon the implementation occurs. In this poster we focus on presenting and discussing the methodological approach for the research. Complementary we discuss one episode emerging from the implementation of one of the tasks (with a group of 5-year-old pupils) focusing on one of the teachers IK when giving meaning to a student comment on "measuring a wale". The results of this study enhance the role of teachers' interpretative knowledge as one of the pillars that sustains the capacity to engage children in a mathematical discussion. The interrelationship between anticipating students' answers and the set of answers teachers would provide, allow them to make informed decisions and implement significant mathematical practices even in contingency moments.

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References

- Clements, D. H., & Sarama, J. (2007). Early childhood mathematics learning. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning* (Vol. 1, pp. 461–555). New York: Information Age Publishing.
- Di Martino, P., Mellone, M., Minichini, C., & Ribeiro, M. (2016). Prospective teachers' interpretative knowledge: giving sense to subtraction algorithms. In S. Zehetmeier, M. Ribeiro, B. Roesken-Winter, & B. Potari (Eds.), *Proceedings ERME topic Conference Mathematics Teaching, Resources and Teacher Professional Development* (pp. 66–75). Hall: ERME.
- Grossman, P. L. (2010). Learning to Practice: the design of clinical experience in teacher preparation. *Nea Policy Brief*.
- Hiebert, J., & Grouws, D. (2007). The effects of classroom mathematics teaching on students' learning. In *Handbook of Research on Mathematics Teaching and Learning* (pp. 371–404). New York: Information Age Publishing.
- Jakobsen, A., Ribeiro, M., & Mellone, M. (2014). Norwegian prospective teachers' MKT when interpreting pupils' productions on a fraction task. *Nordic Studies in Mathematics Education*, 19, 135–150.
- Mellone, M., Tortora, R., Jakobsen, A., & Ribeiro, M. (2017). Prospective teachers interpret student responses: Between assessment, educational design and research. In In T. Dooley & G. Gueudet

(Eds.), *Proceedings of the 10th Congress of the European Society for Research in Mathematics Education* (pp. 2948–2955). Dublin: Institute of Education, Dublin City University and ERME.