

Collaborative working group between schoolteachers and researchers on the teaching of attributes and measurement in elementary school

Camille Antoine¹

¹Univ. Montpellier, Univ. Paul Valéry Montpellier 3, LIRDEF, Montpellier, France;

camille.antoine@umontpellier.fr

Keywords: Elementary school teachers, professional development, teachers and searchers collaboration, attributes and measurement.

Our PhD project consists of the study of the professional development of schoolteachers involved in a collaborative research with science and mathematics education researchers. This group works on the construction of lessons for pupils from 4 to 7 years old on attributes and measurement based on specific children's books. In our poster, we will present the global project and our hypotheses, the functioning of the collaborative group and our first results after one year of this collaborative work.

Attributes, measurement, and children's books

“Attributes and measurement” is a main topic in the French curricula: it appears at the beginning of preschool as a way for children to explore their environment and to organize objects. As numerous studies agree, working on the attribute itself, before introducing its measurement, is essential to favour a better understanding of the attribute, and this work can be supported by comparison activities. Yet, as Munier and Passelaigue (2015) state, novice schoolteachers face difficulties to distinguish an attribute from its measurement, and this may explain that they experience difficulties to understand and apply the official instructions.

Moreover, teaching attributes implicates many language issues. Indeed, comparison activities need to connect two different objects and to establish a relation between them (for example: “A is heavier than B”). However, in many everyday formulations, the two objects are not mentioned due to an implicit reference to a norm: for example, in the sentence “this child is big”, “big” is used as a property of the child. But, mathematically, it is not correct because “being big” only makes sense in reference to a (often implicit) standard, which constitutes a learning issue for pupils. As adults, teachers well master these implicit standards, and use them in their daily life without any problem. As a consequence, they can underestimate the difficulties it could generate.

In our work, we make the following hypothesis: using children's books to construct lessons on attributes and measurement could be a lever to support attributes teaching and the schoolteachers' professional development, and could generate changes in their practices and their knowledge. Indeed, in our previous study (Master thesis, not published) focused on several children's books involving attributes (such as mass or length), we pointed out that measurement is completely absent of these books and that the connection between text and illustrations can favour the complete formulation of comparisons by revealing the implicit of daily expressions.

A collaborative research setting

To test our hypothesis, we have formed a collaborative working group including five schoolteachers and three science and mathematics education researchers, and we study how this research setting

impacts the professional development of the schoolteachers involved. We are inspired by the lesson studies model (Batteau & Clivaz, 2016) to set up iterative loops of development, implementation and analysis of teaching sequences in order to improve them and, ultimately, disseminate them to other teachers. This system is in line with the research trends that propose to do research “with” rather than “on” teachers (Bednarz, 2004) by articulating a professional aim and a research aim. Moreover, as Abboud, Robert and Rogalski (2022) suggest, we rely on the practices of the teachers involved in order to remain in their *Zone of Proximal Professional Development*.

The collaborative setting began on Autumn 2022. Researchers brought several children’s book, and the schoolteachers chose to work on the attribute mass. Then, the group developed a common plan for the teaching sequence, that each teacher adapted and implemented in her class (according to her practices and the school level). These experiments are recorded, and the group then analyses what happened both from the point of view of the pupils' mathematical learning, and in terms of the development of language formulations. This will support the improvement of the lessons for the next loop of implementation, and, as we expect, favour the professional development of the teachers by reflecting on their first choices and their practices in class.

Our first observations show that the use of children’s books, and the teachers’ pre-existing practices with this medium, stimulate motivation, generate many rich discussions in the group which favour the development of didactical and content knowledge, and support reflexions on their own practices.

In our poster, we will present our first analyses, based on preliminary interviews with the teachers and the recorded interactions inside the group (between teachers and with the researchers), concerning how the use of children’s book supports teachers’ development regarding both the concepts of attribute and measurement and their learning process, and influences the choices made by the schoolteachers in the lessons and in their practices, after the first year of collaborative work. We will also present implications for the next steps of our setting, and continuations of our research.

References

- Abboud, M., Robert, A., & Rogalski, J. (2022). Interroger les pratiques de formation des professeurs de mathématiques : Orientations de recherche et perspectives (un agenda) [Interrogating the training practices of mathematics teachers: Research orientations and perspectives (an agenda)]. *Annales de didactique et de sciences cognitives, Thématique 1*, 261–285. <https://doi.org/10.4000/adsc.1865>
- Batteau, V., & Clivaz, S. (2016). Le dispositif de formation continue lesson study : Travail autour d’une leçon de numération [Lesson study: Working on a numbering lesson]. *Grand N*, 98, 27–48. https://irem.univ-grenoble-alpes.fr/medias/fichier/98n2_1552555015011-pdf
- Bednarz, N. (2004). Collaborative research and professional development of teachers in mathematics. In M. Niss, & E. Emborg (Eds.), *Proceedings of the Tenth International Congress on Mathematical Education*. IMFUFA, Department of Science, Systems and Models, Roskilde University.
- Passelaigue, D., & Munier, V. (2015). Schoolteacher trainees’ difficulties about the concepts of attribute and measurement. *Educational Studies in Mathematics*, 89(3), 307–336. <https://doi.org/10.1007/s10649-015-9610-6>