

Spontaneous activities in kindergarten as inquiry-based mathematics

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Finding the flowers – a spontaneous IBMT activity initiated by the teachers

This pilot study is a cooperation between the project SUM, organized by UiT The Arctic University of Norway, and the Norwegian Centre for Mathematics Education. The main focus in the SUM project is to investigate challenges in the transitions in the Norwegian educational system and how inquiry-based mathematical teaching (IBMT) can make these transitions more coherent. The participants in the SUM project, from both kindergarten and school, were introduced to a 3-phased didactical model for structuring IBMT (Haavold and Blomhøj, 2019). The model includes these elements: Phase 1: Setting the scene, phase 2: investigating and phase 3: shared reflections. This view on how to approach and learn mathematics resonates with how the Norwegian Framework Plan describes the mathematics subject area (Quantities, spaces and shapes) and how to work with it (Norwegian Directorate for Education and Training, 2017).

The participating kindergarten teachers (KTs) and school teachers problematized differences in, for instance, teachers' and kindergarten teachers' planning time and the distribution of spontaneous activities, free play and planned activities in the kindergarten context compared to the school context. In this pilot study we approach these differences with the following research questions:

How might the three phases in the didactical model for structuring IBMT appear in a spontaneous activity in a kindergarten context, and can spontaneous activities be regarded as inquiry-based mathematics?

The term “teaching” itself is not commonly used in the Norwegian kindergarten context although the work that kindergarten teachers do is considered as professional work. The Norwegian Framework plan is specific about what kindergarten teachers must do to achieve the content and tasks described in the plan. We therefore choose to use the term teaching to describe the professional work that both kindergarten and school teachers do. However, there are some differences in the work of teaching in Norwegian kindergarten contexts compared to the school context, which also is described and debated by the participants in SUM. Hence, we argue that a model suitable for teaching in a school context may need to be adapted to fit the kindergarten context.

We define spontaneous mathematical activities as activities that are not planned and can be initiated by either children or kindergarten staff. In the IBMT didactical model, mathematics is in focus. In daily life, however, children just want to solve the problem. Spontaneous activities therefore present some challenges along, due to the influence of the staff. Lossius and Lundhaug (2020) discuss the dilemma that arises when choosing between joining or observing an activity. Mason and Spence (1999) argue that this is knowledge about how to act in the moment.

This study is a pilot case study and a part of the SUM project. The data collection method is observation, field notes and interview. The researchers participated in the everyday life in one Norwegian kindergarten for one day. The researchers observed and interviewed two kindergarten teachers in daily situations and aimed to focus their observations on the mathematics involved in spontaneous situations. However, as Flottorp (2020) states, it is difficult to capture these situations by being present. Consequently, participating kindergarten teachers are co-researchers since they made additional observations and fieldnotes without the researchers present. We illustrate one of the spontaneous activities by the following vignette:

The kindergarten teachers had planned to go looking for meadowsweet (mjødurt in Norwegian) which is used to make juice. The aim of first excursion was just to find the plants, not to pick them, so one of the kindergarten teachers asked the children how they would be able to find the plants again the next time, when they were going to pick them. After some discussion, they agreed upon making a map about the places.

In the vignette above, the KT made the activity more inquiry-based by posing a question. This question acted as a phase 1 element and set the scene for children to investigate the problem in phase 2. Making a map was not part of the original plan, but a spontaneous idea from one of the KTs. In the interview the KT told the researchers that the suggestion was based on her experiences from the SUM project. She decided in the moment that this idea had the potential to turn the “looking for plants” activity into an inquiry-based mathematics activity for the children.

Knowing how to act in the moment and to change your plan is an important part of kindergarten teacher’s mathematical knowledge. We argue that the vignette is an example of an inquiry-based mathematics activity, that was not planned. It also illustrates our initial finding, that at least phases 1 and 2 can appear in spontaneous activities. Our next step is to further investigate how we can identify phase 3.

References

- Flottorp, V. (2020). How to Support Kindergarten Children in Spontaneous Measuring Activities. In M. Carlsen et al. (eds.), *Mathematics Education in the Early Years* (pp 333–350). Springer Nature https://doi.org/10.1007/978-3-030-34776-5_8
- Haavold, P. Ø. and Blomhøj, M. (2019). Coherence through inquiry based mathematics education. *Eleventh Congress of the European Society for Research in Mathematics Education*, Utrecht University, Feb 2019, hal-02429769
- Lossius, M. H. and Lundhaug, T. (2020). Mathematical Problem-Solving Visualised in Outdoor Activities. In M. Carlsen et al. (eds.), *Mathematics Education in the Early Years* (pp 127–12). Springer Nature https://doi.org/10.1007/978-3-030-34776-5_8
- Mason, J., & Spence, M. (1999). Beyond mere knowledge of mathematics: The importance of knowing-to act in the moment. *Educational Studies in Mathematics*, 38(1–3), 135–161.
- Ministry of Education and Research. (2017). *Framework plan for the content and tasks of kindergartens*. Ministry of Education and Research.