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# Early childhood teachers' awareness of the characteristics of picture books for learning mathematics

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## Research topic and theoretical framework

There is growing research which provides evidence that the use of picture books in the early years of schooling can contribute to the learning of mathematics (e.g., Van den Heuvel-Panhuizen et al., 2016; Van den Heuvel-Panhuizen & Elia, 2013). However, it is also known that different books can generate different amounts and different kinds of mathematical talk (Anderson et al., 2000). Therefore, it is essential to know what picture books can offer to elicit mathematical thinking of children. In particular, this knowledge is important for early childhood (EC) teachers when they use picture books to create opportunities for children to gain informal mathematical experiences. The study presented in this poster is a part of a research project which is carried out to acquire cognizance of how to enhance teachers' competence in using picture books in early childhood mathematics education.

The study builds on our previous research in which we developed and researched a framework of learning-supportive characteristics of picture books for learning of mathematics (Van den Heuvel-Panhuizen & Elia, 2012). This framework consists of two parts. Part A incorporates the mathematical content that is offered in a picture book. Besides the usual content domains this also refers to mathematical processes and attitudes, and mathematics-related themes. Part B describes how the mathematics is presented. It includes both the way of presentation and the quality of it.

The goal of the present study is to investigate whether the teachers are aware of the learning-supportive characteristics of picture books, specifically whether they are aware what mathematics can be found in picture books and the way the mathematics is presented, and whether the framework is of use for recognizing opportunities of picture books to support children's mathematical development. The latter is the focus of the poster.

## Method

To investigate whether the framework helps to improve teachers' awareness of the opportunities picture books offer for early childhood mathematics education, a qualitative study was conducted in Cyprus and Norway with respectively 6 and 4 in-service EC teachers, who had to evaluate two picture books with and without the framework by filling in for each book two times an open questionnaire specially developed for each book. The picture books are regular trade books of high literary quality, not purposely written for teaching mathematics, but they tell appealing stories which form a meaningful context for engaging children in mathematical thinking. In both countries we used the same wordless picture books. In this way teachers have also more freedom to recognize learning-supportive characteristics and can develop their own ideas of using them. In the data analysis the focus was on finding noteworthy changes in teachers' answers between the two rounds.

## Results and discussion

Overall, we found that in both rounds teachers' answers involved to a greater extent learning-supportive characteristics included in the supply of mathematical content (Part A) than characteristics referring to the presentation of mathematical content (Part B). Moreover, the answers often were short and without explaining their thinking. They rarely referred to mathematical processes or dispositions. Possibly they are not accustomed to using picture books or the framework did not appeal to them. Regarding the mathematics that was found, the framework helped the teachers to see different or more mathematics and further specify the identified mathematics from the first round. The framework also had a positive contribution to teachers' evaluation of how the mathematics is presented. However, in some cases the framework did not have added value. In the second round a few teachers just used the wording of the framework, while their answers earlier were more detailed and relevant.

Our study has shown that the framework has potential to make teachers aware of the learning-supportive characteristics of picture books for supporting children's learning of mathematics. Our next step will be to use our findings to set up a professional development for EC teachers.

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