



Brief

Play with problems

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Purpose and method: In this article, the relationship between play and mathematical problem posing and problem solving is explored both in kindergarten and in the first few years of school. We investigate this because kindergarten has traditionally had a strong emphasis on play whereas the new compulsory curriculum's emphasis on play in school (Utdanningsdirektoratet, 2020). Problem posing and problem solving has been identified in earlier research as a natural part of play in kindergarten (Fosse, 2020a, 2020b) as children in play are naturally experimental (Fauskanger, 1996). We want to see how problem posing and problem solving in kindergarten, when children play digital apps, could be related to *regnefortelling* (number story) written by students in Grade 2. *Regnefortelling* involves children posing and solving their own problems using words, pictures and mathematical symbols.

Our research question is: *How can posing and solving problems be seen in the context of play in kindergarten and in beginner education?*

Theoretical framework: The theoretical framework comes from previous research (Fosse et al., 2020) which connected problem posing and problem solving to two of Bishop's (1988) universal mathematical activities, Playing and Explaining. Bishops (1988) linked the mathematical activity Playing to the question "How?" as the basic premise of any problem solving. The question of "how" is closely related to (but not coincident with) the question of Why which is the question related to the mathematical activity Explaining. In our previous research (Fosse et al., 2020), we identified that problem posing and problem solving was connected to whether the children were engaged in: routine or non-routine problems; known or unknown problem solving strategies; explaining with body language or explaining with words; and to play with "what-if". After some adjustments to match the new kinds of

data, it was possible to identify how Playing and Explaining were related to problem posing and problem solving in the data.

Result: The results show that when children engage in problem posing and problem solving at the same time, both in kindergarten and in the early years of school, the main exploring or play with “what-if” scenarios occurs with changing aspects of solving problems. In most cases the children focused on one response that they considered to be the most appropriate one for the problem that they posed themselves.

Implications for practice: By looking at children’s play with problems, we could recognise where children’s posing and solving problems were linked to their possibilities for being creative. However it also provided insights into other aspects of problem posing and problem solving that could be developed by teachers with school students writing regnefortelling.

Keywords: *play; problem posing; problem solving; number stories (regnefortelling)*