

# Teaching/Learning Geometry in Preschool: Children's Experiences and Discernment

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The increased interest among politicians and researchers in the West according to children's mathematical learning and mathematical achievement imposes new requirements on preschool teachers work with teaching. Many of the Swedish preschool teachers (at least in this study) were educated before 1998 when the preschool curriculum came. They didn't have mathematics in their teacher education. In the municipality where the preschools in this study are located mathematics is a priority and they are working with implementation of the revised curriculum (2010, 2011). The aim of this short communication is to present praxis near research (as a part of my thesis) in three Swedish preschools.

Theoretical framework in this study is the variation theory (Björklund, 2007; Marton et.al., 2004; Runesson, 2006). The variation theory is a theory of learning that links teachers' actions with children's experiences. According to this theory learning always has an object and in this study it is geometry; geometric figures and in particular circles. The object of learning is experienced and conceptualized by the children in varying ways. *Variation* is a primary factor and it supports children's learning. In order to understand what variations a preschool teacher can use to support learning, a critical point is to understand children's varying ways of experiencing something. That means that teachers have to find out what different experiences children have of the object (geometric figures). The critical conditions are interacting parts of the entire learning process and to experience geometric figures the child must have opportunities to discern critical criteria related to the object of learning. Thus *discernment* is also an important factor that teachers have to be aware of. Some critical aspects of the object of learning need to be discerned *simultaneously*. How the child is experiencing geometric figures depends on if the child at the same time may reflect certain aspects of what is discerned. What aspects that occur simultaneously is another factor that preschool teachers need to have knowledge about.

The overall aim with this research is to find out if it is possible for preschool teachers to work goal-oriented (teach) and also come close to children's perspectives by focus on children's interests and experiences. The research seeks answer to following questions:

1. How could preschool teachers design goal-oriented work with geometric figures in relation to variation theory?
2. How could preschool teachers work with the concept of circles (geometric figures) and variation in everyday activities?

The study is based on observations and interviews with 15 preschool teachers from three preschools. The preschool teachers are working with the object of learning (geometrical figures) in fairy tales and other everyday activities. They design the learning situation together in the working team; decide which critical aspects they have to make visible for the children and how they will carry out and didactify the teaching. In this short presentation the selection of case include different phases of the game *Cirlcehunt*. The goals with the game are that children will have opportunities to discern circular shapes and learn circular criteria in a play situation. In this example one preschool teacher and sex 4 year old children are playing together. The game starts with a *fairytale* and the goals are to find out what different experiences children have of the object and to give children opportunities to discern different shapes. After the fairy tale the preschool teacher presents the object of learning and she shows a circle's attribute (critical aspects); perfectly round with a curved line. Then the children have a problem to solve; sorting circles in different sizes and colours. They have to reflect on differences and similarities between circles. The preschool teacher listen, reflect and evaluate. She highlights some conclusion and after that she extends the game with new problems for the children to solve. Now they have to discern and pick circles from a sample of geometric figures like for example hexagon and ellipse.

The findings so far show that the preschool teacher's intentions and what they really do is not always what the children learn. The preschool teachers need knowledge of children's different experiences and they have to have the same focus as the children. They also need theoretical knowledge together with their practical knowledge in order to make the didactical situations as learning situations. The theoretical knowledge includes mathematical knowledge and knowledge about variation theory.

## References

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