**Light and Shadow in primary school - Towards elementary optics and understanding radiation**

**Light & Shadow**

Human experience of light is an experience of brightness, of illuminated surfaces and of light sources. We cannot see a path, and neither whether light travels or not. Learning to explain shadows is a content of elementary and middle school curricula.

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**Research questions**

In what way varies children's expressed experiences about light and shadow before and after participating in different lesson designs? Are the different experiences possible to be explained by differences in instruction?

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**Learning Study**

A teaching sequence of 3 lessons was taught in 3 different groups of pupils (1 group 2nd grade & two groups 3rd grade) by two different teachers.

The first two lessons were introductory and included manifold possibilities to experience light and shadows → "introductory lessons".

The third lesson was focused on. It was revised twice → "lessons A, B, C"

Each of the groups took a pre- and post-test. Follow-up tests are scheduled for August / September 2017. → test

**Aim & Analysis**

The aim of this study is to describe children's understanding of an area of light and shadow during instruction. Results pointing out what seems to make a difference for children's knowledge development contributes to changes in how to teach young children about natural phenomena. We use a phenomenographic approach to analyze the children's expressed understanding on written tests before and after instruction. By that, we capture different ways to experience the same phenomenon. Children in three different classes each participate in the same lesson. We assume the children's previous knowledge to affect their development of understanding, and the design of the phenomenographic analysis is based on finding categories of similarities and differences between individual children as well as among children in the same class, and between children from different classes.

The study also tests if the method used for analysis can be used to provide researchers with new knowledge of how to define correlations between teaching and learning. In this study we define learning as a changes in the way we experience a phenomenon, in a more qualitatively developed way.

**Results**

The analysis is still going on, but differences between children’s experiences can be found, due to differences in lesson design and depending on the children's pre-knowledge. Preliminary results indicate that children who easily grasp important features of the content taught did not benefit from differences in instructions as much as children who were in need of a more explicitly designed instruction.

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**Discussion**

In the final analysis, important features during instruction will be in focus. The analysis will be based on Variation Theory (Marton, 2015; Holmqvist, 2011), to find what aspects the students discern during instruction with different designs.

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**References:**


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