

Mathematics Education and the socio scientific issue 'Reducing Waste'

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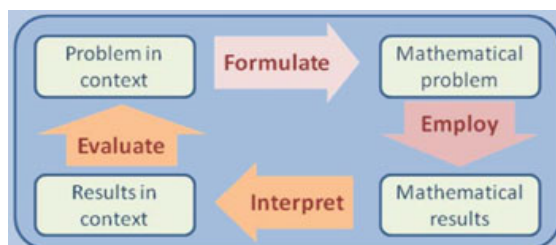
TOPIC **Material Dimension**, Workshop

1. Abstract

Every year, Utrecht University in collaboration with Malmberg (educational publisher) and other institutes involved in mathematics education organises the MathInquiryDay for primary education in the Netherlands. This MathInquiryDay is a day for all children from grades 1 to 8, devoted to mathematical literacy. It focuses on (promoting) inquiry-based learning where students are involved in working on a set of coherent challenging meaningful activities. During the MathInquiryDay, children are challenged via assignments in order to learn to use their mathematical skills (Jonker et al., 2019). The MathInquiryDay is a powerful 'add-on' to the daily practice of mathematics education. During MathInquiryDay, children actively work together on problems that fit in with their daily lives and through these more open assignments, the aim is to show children that mathematics is fun and useful (Keijzer et al., 2009). This mathematical literacy approach fits into the broader competence of 'scientific literacy', absolutely necessary to be(come) a critical citizen.

Scientific literacy

Scientific literacy consists of three aspects: knowledge, skills and behaviour. You need to build concrete activities into your education to work on this. The MathInquiryDay is an interesting testing ground, because here, concrete attention is paid to using your skills (and underlying knowledge) in 'new' situations. Those situations request a 'problem solving approach' that we also know from the Pisa modeling cycle (2015):



The situations from the MathInquiryDay are perfect 'sandboxes' to experience the different steps of this modeling cycle, all needed for improving mathematical literacy, thus stimulating Children's critical thinking skills (Jonker et al., 2019; Keijzer, 2018). We give examples from 2022 and 2023.

MathInquiryDay 2022

On 30 March 2022, the 20th MathInquiryDay took place. This time the children worked on the theme 'Building Adventures'. Building involves all kinds of mathematical activities, such as drawing, estimating, classifying and planning. During the 20th MathInquiryDay, children's brainpower and hand skills were combined. The pre-schoolers designed various parts of a zoo, the children of groups 3 to 6 (age 7 to 10) became real architects and the children of group 7 and 8 (11/12 years old) designed their own tiny house. A tiny house is a detached, small house that people live in (Tiny House Netherlands, 2020). A tiny house may have a maximum living area of 50 m², but the maximum of 28 m² is often used. The maximum height is 4 m. A tiny house has everything you need to live in it with 1 or 2 people or even a family. People choose such a tiny house to be better for the environment and use less stuff.

Group 7 and 8 in particular also considered the environment and aspects of critical citizenship. For example, the children worked with mathematics to design a tiny house that is practically furnished, environmentally friendly and contains only the necessary items. During the MathInquiryDay 2022, the children from grades 7 and 8 learned what a tiny house is, why people want to live in it and designed the façade and a floor plan.

Tiny houses



MathInquiryDay 2023

On 29 March 2023, students from Dutch primary schools will again engage in challenging assignments, this time around the theme 'Waste Games', a MathInquiryDay in which our consumption behaviour is magnified when it comes to creating waste, but also reprocessing, reusing and reducing waste, e.g. more convenient/less packaging. The MathInquiryDay aims to contribute to a shared sense of responsibility for our environment, a careful attitude towards the environment and an understanding of one's own contribution to (solving) the problem while doing the maths. In addition, many classes make something beautiful out of waste in a creative way and reuse waste in this way. For example, groups 1 and 2 will make an instrument out of waste.

Musical instruments, made out of waste



Results

We collect data of the MathInquiryDay by two means: an online questionnaire to all users (mostly about 200 respondents a year), and a small amount of observations during the day itself (by visiting one or two schools, observing the children, and interviewing some teachers). We will present data from both days, and have a discussion in the workshop about this approach and its effectiveness, about the professional development (both in-service and preservice) than can improve the necessary skills of the teachers, and the kind of research needed.

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