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Primary school children and teachers discover the nature and science of planet Earth and Mars

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For various reasons primary schools emphasise language and calculus rather than natural sciences. When science is taught at all, examination systems often favour technological tricks and knowledge of the 'right' answer over the process of investigation and logical reasoning towards that answer. Over the long term, this is not conducive to curiosity and scientific attitude in large parts of the population. Since the problem is more serious in primary than in secondary education, and as children start their school career with a natural curiosity and great energy to explore their world, we focus our efforts on primary school teachers in close collaboration with teachers and researchers. Our objective was to spark children's curiosity and their motivation to learn and discover, as well as to help teachers develop self-afficacy in science education. To this end we developed a three-step program with a classroom game and sand-box experiments related to planet Earth and Mars.

The classroom game Expedition Mundus simulates science in its focus on asking questions, reasoning towards answers on the basis of multiple sources and collaboration as well as growth of knowledge. Planet Mundus is entirely fictitional to avoid differences in foreknowledge between pupils. The game was tested in hundreds of classes in primary schools and the first years of secondary education and was printed (in Dutch) and distributed over thousands of schools as part of teacher education through university science hubs. Expedition Mundus was developed by the Young Academy of the Royal Netherlands Academy of Arts and Sciences and De Praktijk. The tested translations in English and German are available on http://www.expeditionmundus.org.

Following the classroom game, we conducted simple landscape experiments in sand boxes supported by google earth imagery of real rivers, fans and deltas on Earth and Mars. This was loosely based on our fluvial morphodynamics research. This, in the presence of a scientist, evoked questions that were developed by Aristotelian discourse towards researchable empirical questions. Here teachers and scientists closely collaborated to develop effective queries. The final questions were then investigated by couples of pupils following the empirical cycle up to the point of a poster presentation.