



Geology in school

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Geology is not taught as a separate subject in Swedish schools, which has resulted in general deficiencies in understanding Earth System Sciences amongst the general public. Teaching geology with a holistic approach would provide students an opportunity to learn about sustainable development and climate change. This could be achieved by linking knowledge about biotic and physical environmental factors in modern and ancient ecosystems in the context of evolutionary theory.

After interviewing teachers, it has become clear that the reasons why geology is taught to such a limited extent in schools is that most teachers feel uncomfortable with the subject, combined with the general and incorrect belief that geology cannot be integrated in the curriculum.

My work has aimed to show teachers how to include geology in the curriculum by integrating topics relevant to the school's local environment. The basis of the work involves supervising teams of teachers at several pre-, compulsory, upper secondary and high schools in the municipality of Kristianstad, southern Sweden, where local strata host abundant and diverse Late Cretaceous fossils. During the planning stage, I developed my own objectives/outcomes table that tailored specific goals for individual teams of teachers. Based on this table, I developed educational materials and activities that were demonstrated and tested at the various schools. These newly developed teaching materials and activities link geology, curriculum and the local environment, and consist of the following:

- The story "Fossil Hunting" informs about the prehistoric life in the local environment around 80 million years ago by using magnetic paper shapes, sand and seashells. The story is followed up by hands-on searching for fossils in the local environment.
- In the game "Who eats whom?" the students represent fish, belemnites, plesiosaurs and mosasaurs from the prehistoric ocean chasing and catching each other to illustrate the prehistoric food chain.
- In the game "What is a dinosaur?" the students meet the marine reptile "Simis", the pterosaur "Flygis" and the dinosaur "Trampis" and help them to find their respective habitats - sea, air or land.
- In the exercise "Timeline" the students represent different animals from the entire geological record, which is represented by a 100 meter long timeline. The different periods are marked with illustrations of Earth's plate tectonically settings at respective times.
- In the exercise "Time Machine" the students receive a list of dinosaurs that they will meet when traveling in the time machine. The students physically outline the sizes of the dinosaurs in the playground and contrast them with different items and structures in their surroundings.
- "The secrets of fossils" is an active lecture where the listeners are provided with clues to solve mysteries relating to fossils in the local environment.
- "Darwin day" is a day dedicated to Darwin's 200th anniversary containing discovery tents about evolution and natural selection, a voyage of discovery consisting of Darwin's voyage around the world and a theatrical performance about Darwin's life. This is an age-overlapping activity in which high school students served as guides for younger students in the various activities.

The evaluation of the teachers' supervision, the use of objectives/outcomes tables and the newly developed teaching materials received positive responses and showed that the teachers gained skills and insights that they will continue to use and develop since they have acquired a common 'educational language' and new templates for quality reports and written assessments. The investigation also revealed that the teachers now feel safer in the geology subject and that they can respond to the students' future geology-related questions about their local environment.

