Abstract of doctoral thesis

Title: Teaching a Spatial Geometry and Developing Spatial Abilities Using a Computer
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Abstract:
In this thesis we present a contemporary overview of current possibilities of using computer support for teaching geometry and the development of spatial imagination.

The materials are aimed at the secondary school curriculum (for students 15–19 years old), many of them, however, could be used for younger or older students. The work is outlined as a tool and a set of teaching materials for teachers.

The basic part of this thesis is a set of commented examples and tasks that can be solved by the use of dynamic geometry systems including the 3D models for these tasks. The set consists of more than 100 problems and examples with hints or answers and includes a CD with more than 300 supportive models including models–templates for creating tests.

Materials include some prepared spatial imagination tests and quizzes. Some of the models serve as a tool for their design and offer automatic solution checking. We present also our own set of educational applications and games created to support the improvement of spatial imagination skills with prepared sets of tasks, including teaching and explanatory materials. Finally, we evaluated the experiment, which confirmed the positive impact of playing didactic computer games on the spatial imagination of students.

Keywords: Spatial geometry, Spatial abilities, Dynamic and Interactive geometry