

Using Origami to Teach Geometry to High School Students

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In the syllabus of the Gymnasium (equiv. of secondary school/high school) in the state of Baden-Württemberg, geometry occurs in several grades. In 5th and 6th grades students are taught the basics of ruler and compass constructions. At the start of 8th grade teachers usually do a rehearsal of these topics before going on to more involved subjects. This rehearsal is often the last chance for kids to understand the foundations of geometry. On the other hand, many students who understood the basic principles of geometry in the early classes usually feel bored by two weeks of repetition at the beginning of a new school year.

As the geometry foundations are crucial, the authors have undertaken an experiment to teach these basics in a two-week-tutorial using origami as an alternative approach to the same field. By highlighting the mathematical concepts of folding in origami and comparing them to ruler and compass constructions, many students see geometric questions in a new light and understand the concepts of geometry much better. The use of origami foldings serves a double purpose in this scenario: Firstly, the exact nature of origami foldings and the need to work as precisely as possible can be motivated by the quality of the result. Secondly, students who have deficits in understanding mathematics from an abstract point of view get the chance to try a hands-on method to mathematics, much different to most from the standard ways of teaching the subject in gymnasium.

The authors used a Zulassungsarbeit (teachers' exams thesis) to develop all course materials for the origami geometry introduction. The material was scaled to several different scenarios and tested on a class of students from the mathematical branch of St.Raphael Gymnasium, Heidelberg. Complete coverage of the functional as well as the social goals of the course as well as the evaluation of the course success by a course survey were conducted and covered in the exam thesis.