

# Activities in Geometry built with GeoGebra around traditional Jewish artifacts

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Traditional Jewish artifacts show different kinds of symmetries: rotational symmetry, axial symmetry, sometimes translations (e.g. in architecture). Other affine plane transformations may appear, such as affinities (see [1]).

The study of these geometrical features may be a basis for courses in plane and space geometry and in analytic geometry. This has been the basis for mathematical activities for a population of students coming from the so-called orthodox population in Israel. Until their arrival to pre-academic programs and then to undergraduate studies, these students have studied previously only Talmudic studies, therefore the usage of artifacts from their natural environment helps to draw their attention.

This symbiosis is the basis of various works in Mathematics Education. Moreover, the usage of technology helps the students to find their own experimental way to acquire more mathematical knowledge, the technological skills being part of this new knowledge. This has been used a couple of years ago for a course on Analytic Geometry both for pre-service and for in-service teachers (see [3]).

We are currently experimenting this framework both for high-school students and for undergraduate students. This fits the official syllabus. The main technological tool used in these courses is GeoGebra.

In our talk we will describe an activity built around architectural motives, and show how students used GeoGebra to build a model, by enhancing knowledge in Analytic Geometry. If some students use the DGS only as a plotter, many students use mathematical knowledge (equations of lines, plane geometry, rotations and axial symmetries) to program their work with the software, plotting a minimal number of elements and reproducing them using plane transformations. We present three different approaches for the mind-and-machine interaction.

We wish to mention that this work is part of an ongoing ERASMUS project on STEAM education headed by Metropolitan University, Budapest.

## References

- [1] Th. Dana-Picard and S. Hershkovitz (2017): *A Glimpse at Mathematics in Jewish Traditional Artefacts*, to appear in the *Symmetry Journal*.

- [2] Yu Manin (2015): *Mathematics, Art, Civilization*, in *Art in the Life of Mathematicians* (Anna Kepes Szemerédi, ed), American Mathematical Society, RI: Providence, 168-186.
- [3] N. Zehavi, R. Zaks and Th. Dana-Picard (2006): *Analytic Geometry, Computer Assisted Activities*, Teachers resource e-book, Machshevatika, Department of Science Teaching, Weizmann Institute, Rehovot.