

## SONA DRAWINGS: A DIDACTICAL SOFTWARE

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A *lusona* is a sand drawing consisting of a rectangular net of dots and one or more closed polygonals enclosing the dots. The polygonals are drawn respecting a few easy rules.

Sona drawings have many possible didactical uses, at different school level, as it has been shown by Gerdes. Among them the introduction of the notion of GCD.

To make more evident the link between indigenous and scientific knowledge, the past and present, a software has been implemented that allows a PC to draw (in a continuous motion) a *lusona*, once its dimensions (that is the rectangle sides) have been chosen.

The software aims also to provide teachers with a new didactical tool from which pupils could benefit in their appropriation of one of the less beloved mathematical concepts. It is often too hard for them to understand what the GCD of two natural numbers represents: its computation is just a technical and hard exercise! On the contrary, *Sona* software allows users to consider the GCD as the solution to a geometrical problem: how many polygonals are necessary to enclose a set of dots ordered in a  $P \times Q$  rectangle?

The piloting of the software is part of a didactical proposal, consisting in a module under implementation in a few Italian schools. The proposed module starts from teacher drawing on the blackboard a couple of full *sona* and soon after a partial one, with no explanations. Pupils, working in small groups, are then asked to investigate the rules needed to make the *sona* and to draw (pencil-and-paper) a few of them. Soon after, the software can be used to have more examples in very short time. Pupils are also asked to focus their attention in the number of the lines  $N$  needed to enclose the dots in the rectangle, to make a record of all the data (the input numbers  $P$ ,  $Q$  and the output  $N$ ) and to conjecture the possible relations among them. Each step is followed by a discussion among the pupils, who, probably thanks to the teacher's guidance, should allow the class to better depict the underlying notion of common divisor, first, and to fully appropriate the notion of Greatest Common Divisor, after.

The module validation is obtained by the comparison of the results of a final test on the GCD submitted to pupils in classrooms where the module has been implemented and pupils in classrooms where the concept of GCD has been introduced in the usual, standard, way.

### References:

- Gerdes, P. (1999), *Geometry from Africa. Mathematical and Educational Explorations*, The mathematical Association of America, Washington, DC (USA).