Transformation Geometry in Primary School According to Michel Demal

Charlotte Bouckaert, UREM ULB

Michel Demal, who started his career as geometry teacher in a teachers training college in 1975, decided to adapt Francis Buekenhout's geometry program for secondary school to six year old children and above. F. Buekenhout, professor of geometry at the Université de Bruxelles, Belgium, advocates the teaching of space geometry with the help of motions. When Demal realised children had enormous difficulties in perceiving the orientation in the 3D-space, he decided to start with plane geometry. He has used for many years now the extraordinarily powerful tool of transparent sheets to compare two figures and to discover the symmetries of a figure.

Children first discover that figures can be superimposed by motion when one glides the transparent sheet on the plane without lifting it, or by reversals when it is necessary to lift the transparent sheet, flip it in space to change side and then glide it.

He insists on motions and reversals during several years before being more specific in introducing rotations and reflections. In the plane, a motion transforms the drawing of a right hand on a transparent sheet into a drawing of a right hand, and a reversal transforms the drawing of a right hand into a drawing of a left hand. Once the orientation in the plane is well assimilated by children, Demal can approach the orientation of the 3D-space. A motion in the 3D-space transforms a right hand into a right hand and a reversal transforms a right hand into a left hand.

Demal classifies plane geometric figures right from the beginning of first year primary school. The criterion of classification emanates from children. They speak of "right" sides and "curved" sides. This leads to a non-trivial classification of plane geometric figures into: the figures having straight sides only, i.e. the polygons, the figures having curved sides only, i.e. the "round" figures, and the figures having both straight and curved sides, i.e. the "hybrid" figures. Children practice logic at a very early age, approaching universal quantifiers, negation, conjunction, disjunction.

Demal has developed his program by building "genetic spirals". The themes selected are sufficiently stimulating to remain interesting until university and they are approached, deepened, extended and enriched at every passage.

With the help of his students when he first started experimenting in primary school classes and now with the precious collaboration of primary school teacher Danielle Popeler, Demal has convinced many primary school teachers that teaching geometry is interesting, not difficult and that children love geometry lessons. Danielle Popeler has written geometry lessons for the first four grades and she is experiencing the fifth grade now. Her colleagues appreciate the continuity of the program. They feel they prepare pupils for secondary school. In order to maintain a sound theoretical level, Demal has discussed his project regularly with Francis Buekenhout.

More information can be found on the website Demal, Popeler & Dubucq have developed: http://www.uvgt.net/