USING COMPUTERS FOR DIDACTIC ACTIVITIES ON AREAS: A CASE STUDY

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The teaching of area of simple geometric shapes (circle, rectangle) in elementary schools is characterized often by the difficulties that pupils face in understanding some basic concepts concerning them. For example, the confusion between perimeter and area of a shape or the "mysterious" number π.

Within the framework of teaching areas we tried to cope with two special didactic problems that are related to the π-estimation and the change of the area of a square or a rectangle when we alter their dimensions with the support of a computer. Specifically for the teaching of these matters in the 6^{th} grade of an elementary school we used the Cabri-geometer, Excel and in some cases freeware like a Java applet. Especially for the π-estimation we used, in Cabri-geometer, a combination of inscribed and circumscribed normal polygons as we were increasing the number of their sides (Archimedes's method), we used Excel for performance and recording relevant computations in a matrix and a Java applet for the Buffon's needle experiment which is connected with π. The same software had been used for the processing of resultant data when dimensions of a square or a rectangle had been changed (e.g. they had been doubled or increased by adding a constant length).

Pupils easily accepted the notion that when we increase the number of sides of the inscribed and circumscribed polygons we could "approximate" π, namely we could find out that the average of the areas of the two polygons is "probably" the area of the circle, which divided by r2, equals the desirable number. However some pupils claimed that when we increase the number of sides of the circumscribed polygon the area increases while others used perimeter instead of area. Of course this method doesn't permit an accurate estimation of π but we think it is important the fact that pupils could "use" (even with teacher's guidance) approximating methods. We also simulated via a Java applet the Buffon's needle experiment for the π-estimation. The simulation offered the opportunity to pupils to toss as many needles as they wanted.

In rectangles and squares pupils easily concluded that if we multiply their dimensions with a number, then the second power of this number indicates how many times its area increases. When they had to estimate such an area, they generally responded positively. Some of them wrote correctly the power (e.g. 4^2) but they failed in calculating it (e.g. 4^2=8). A difficulty showed up when we increased the dimensions of a square adding a constant length. The teacher had to guide them with Cabri-geometer's help to find out graphically the similarity with the previous case.