

Proofs in Geometry: Using Computer Software for Delineating Problem Space

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The way in which geometry objects are mediated by dynamic geometry systems (DGS) make possible a significantly better visualisation of geometric properties and relations among objects. Furthermore, DGS enable the students to efficiently explore geometric properties with sophisticated tools, thus enable a more active learning and a better understanding of geometry. On the other hand, the proofs in geometry, once considered the polygon for learning deductive reasoning, became a less pronounced part of school geometry. This fact, of course, is not a consequence of the exploratory tools found in DGS, yet it is true that DGS do not stimulate students to look for deductive arguments and, in general, do not facilitate the constructions of proofs.

We shall present a software program that has been developed by the author in order to help the students in constructing the proofs of geometric facts and, more generally, to learn deductive argumentation in geometry. A geometric configuration, related to some theorem, can be drawn directly in the software or can be imported from standard DGS. Basically, the software considers the drawn construction and warns the student of several potentially relevant facts. The student then selects the facts that s/he finds eventually relevant for the proof. In this way the software helps the student to set the problem space. The student then logically connects in an iconic and/or symbolic view the premises of the theorem to the consequences using the facts in problem space. The difficulty of the process of the construction of the proof depends on the properties of the problem space. Therefore several mechanisms are included for making the problem space controllable and structured. The software can be used as well for exploring configurations and finding out novel properties (theorems).