Polya and GeoGebra : A dynamic approach to problem solving.

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Abstract :

Problem solving has been investigated in mathematics education for more than 60 years ago with the pioneering work of George Polya (Polya , 1965). The four steps he proposes : understand the problem , devise a plan , carry it out and look back still apply in many instances. In recent years the emergence of dynamic mathematicss has enhanced the student creative and heuristics skills allowing the immediate construction of mathematical objects, their relationships and their interactive manipulation (Christou , Mousoulides , Pittalis & Pitta - Pantazi , 2005) , this has generated great interest in building dynamic learning scenarios to support the different stages of problem solving. In this paper a learning approach to problem solving activity using GeoGebra , one of the most popular tools of dynamic mathematics is presented.

Keywords: dynamic mathematics, GeoGebra, problem solving, Geometry

Introduction

”First, guess; then prove... Finished mathematics consists of proofs, but mathematics in the making consists of guesses” (Pólya, 1966)

The GeoGebra environment is very useful as a teaching and conceptual tool at different stages of the problem solving methodology suggested by George Polya. Given a mathematical problem it is possible to **understand** it through the construction of a dynamic model , where their objects and relationships are explicit. Using this model the student can formulate conjectures and then develop a **plan** to validate them. To **carry out** the validation the so called dragging tests are of great help to “verify” their correctness. Finally , **looking back** you can discover new properties of the objects involved in the problem statement, consider the following geometric problem:

Construct a circle with center C, define two points on it located in the bottom of the circle (A and B). Join A to C and B to C, forming a central angle (<ACB) .
Define a point D on the top of the circle, join A with D and B to D, forming an inscribed angle (<ACB) (Figure 1).

- *What is the relationship between the two angles?*
- *Is this relationship preserved if A, B and D change of position on the circle?*