

## **The Mathematics Education into the 21<sup>st</sup> Century Project**

The Future of Mathematics Education

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### **Mathematical Competences and Types of Problems**

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Taking as the starting point the Secondary School curriculum within Latin American Educational Reforms, we propose a learning assessment procedure based on the solving of types of problems and the students' types of mathematical competences (Fondecyt Project N° 1040035).

Mathematics assessment based on knowledge focuses on the solving of algebra and geometry problems classified according to their nature into routine and non-routine; and according to their context into real, realistic, fantasy and purely mathematical (Díaz, Poblete, 1994).

A routine problem, based on its context, will be classified as real if it occurs in reality and involves the student's work in it. A context problem is realistic if it is likely to occur; it deals with a simulation of reality or part of a reality. A context problem is classified as fantasy if it is a product of our imagination and is not based on reality; and a context problem is purely mathematical if it deals exclusively with mathematical objects: arithmetical numbers, relations and operations; geometric figures, and the like. Problems are non-routine when a student does not know the answer for it neither a previously established routine or procedure to find that answer.

The types of mathematical competences relevant to education are classified as Competence Type 1 about knowledge and Development of Mathematical Procedures. This includes understanding and manipulating mathematical concepts and argumentation. It basically consists of problems related to calculations and definitions of the most common type found in conventional mathematical evaluations. Competence Type 2 about Solving of Types of Problems includes identifying, formulating, and solving routine problems of real, realistic, fantasy and purely mathematical contexts that demand making connections in order to be solved. Competence Type 3 about Identifying and Solving Non-Routine Problems includes decoding different ways of introducing mathematical situations, and translating natural language into symbolic/formal language. In other words, it consists of mathematical thinking that involves the capacity to generalise.

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