

The Reform and Development of Plane Geometry Middle School Course in China

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The plane geometry course has been the focus of the reform of mathematics education. The "New mathematics" claims that "Euclid gets out" to reduce the content of plane geometry and to promote algebraization of geometry, resulting in a negative influence on the reasoning ability of students. However, the plane geometry course in China has not been influenced by the "New mathematics".

By the document analysis method, i.e. analyzing the courses, textbooks and teaching of plane geometry in China from 1950 to now, we investigate (1) the evolution of course targets, (2) the evolution of course content, and (3) the development of textbook architecture. By the document analysis method and the interview method, we analyze (4) how to solve introduction difficulties and (5) how to train students in logical reasoning ability, in teaching and textbooks of plane geometry course. By contrastive analysis and experiment, we discuss (6) the new reform direction of the plane geometry course. The conclusions here are:

1. The targets of plane geometry course have always been training the students logical thinking ability, logical reasoning ability and geometric perceptual intuition.
2. The content of the plane geometry course has been simplified. Major materials include intersecting lines and parallel lines, triangles, parallelograms and circles. Specifically, the content about triangles has been studied comprehensively.
3. The textbook of plane geometry is structured from simple geometry to complex geometry, from rectilinear figures to circles, from qualitative to quantitative. Related materials are properly concentrated.
4. China has made efforts to systematically investigate the solution for avoiding the difficulty of introducing plane geometry in the 80s and 90s of the last century and has obtained successful outcomes. The major practices are enlarging the axiom system, connecting experimental geometry and demonstrative geometry. These ensure that the reasoning and argumentation are based on intuitive experiences.
5. The method of training the logical reasoning ability of students can be summarized as "dividing stage, focusing and moving from single to comprehensive".
6. The reform of plane geometry is attempting to develop the discovery ability of students. It emphasizes the curriculum philosophy and treats the geometric object in a systematic point of view. The reformed course enhances the thinking about how to discover the characteristics of plane geometry. The teachers strive to make students master the essentials of the geometry, including connotation of concepts, elements and related elements of geometric objects. Through the study of relations between concepts, elements and related elements, students can discover properties and propose conjectures. Finally, they can prove the properties by a logical reasoning process.