

STUDENTS' GEOMETRICAL THINKING DEVELOPMENT AT GRADE 8 IN SHANGHAI

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The van Hiele model suggests that in geometry education, students' thinking levels are sequential and hierarchical. In this model, the development of students' thinking is not dependent upon age or biological maturation, but on the instruction received (van Hiele, 1984). In the field of research in school geometry, one of the current major concerns is about how to improve pedagogical models and instructional strategies in order to help students to successfully progress from practical geometry to deductive geometry (Royal Society, 2001).

The main aim of this study is to investigate geometry teaching at the lower secondary school level in Shanghai, with particular attention to the relationship of the teaching/learning phases organized by teachers with students' thinking levels demonstrated in classrooms and examination papers at Grade 8 (students age 14). The study focuses on characterizing teaching materials and the interaction between teachers and students in classrooms. It also contributes to identifying effective instructional models and approaches used especially for teaching new geometric theorems in deductive geometry. In the study, two ordinary middle schools in two school districts in Shanghai are sampled. Classroom observation is used, together with data from teacher interviews, student interviews, and students' attainment in mathematics tests and homework.

Analysis of data from the pilot study suggests that an instructional model is consistently used by Chinese teachers in teaching new geometric theorems. An essential teaching strategy used by the Chinese teachers was mutually reinforcing visual and deductive approaches in order to develop students' geometric intuition in the learning of deductive geometry. Based on judgments of students' responses to, and explanations of, questions set by the teacher, students' thinking levels mostly appeared to be between van Hiele levels 2 and 4. Students' thinking in transition from level 1 to 2 was also identified by examining their learning outcomes in test papers. Further analysis of data from the study is continuing to focus on the relation between the instructional structure used by Chinese teachers and their students' geometrical thinking development.

References

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