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Title: Transition from Elementary to Secondary School Geometry : Exploring gaps in teaching and learning

The primary focus of this study is to at explore the gaps in teaching and learning of geometry during transition from elementary to secondary school geometry. This study is based on the large body of recent and expanding research on mathematics education, especially the effort to unravel the complex interlinking of the objects of mathematics and the cognitive representations of these as they manifest in children learning and in mathematics classrooms and in the teaching and learning of this immensely abstract discipline. In the context of the theory and research on which this project is based, the larger question that motivates the study were framed.

The topic of quadrilaterals was identified as appropriate for representing the teaching of geometry because of two main reasons (i) It is one of the important strands of geometrical component which appear in the curriculum at elementary and secondary stages i.e. in classes V, VI, VIII and IX (ii) research has shown this topic as one of the difficult topics for learners to understand because of its hierarchical classification (De Villier, 1994; Monaghan, 2000; Fujita and Jones, 2007).

The following research questions were framed:

1. What is the specific character of a concept like quadrilaterals that students need to internalize and understand in order to use it mathematically?
2. What do classroom interactions between teachers and students reveal about the nature of these concepts?
3. How are syllabi and textbooks addressing the special nature of the concepts and is there any awareness of the cognitive processes that need to be employed in mastering them?
4. How adequate is teacher knowledge for addressing these issues?

5. Given the present scenario in our classrooms, are there moments in the classroom practice that have potential for better teaching and for addressing the mentioned concerns?
6. If these moments are identified for teachers, can they use them creatively and constructively?

A total of 20 secondary school mathematics teachers and 240 students from 4 sections, each of class VIII and IX comprised the sample of the study. This sample was selected from 10 RPVVs that were **randomly selected** from the **purposive sample units** of existing 17 RPVVs schools of Delhi.

The study revealed that there was indeed a significant gap found between the personal and formal 'figural concept' of quadrilaterals of both grades VIII and IX despite of the topic was taught in both the classes.

Study also revealed that teaching was influenced by teachers' own way of learning which is termed as teaching as a cultural activity (Stigler and Hiebert,1999) and has no impact of teacher professional development programs unlike Japanese teachers (Yoshida,1999). As This study calls for improvement in teaching and teacher knowledge, there is need to have good professional development programs which cater to prepare teachers for share classroom activities and knowledge required to teach geometry.

In relation to defining and classification of quadrilaterals, findings revealed that most of the students tend to prefer partitional classification instead of hierarchical and definitions provided by them were not appropriate mathematically.

In textbooks, the overall representation of quadrilaterals is static in nature and has no connection with the use of dynamic geometry tools (software or construction instruments) which are recent developments and has deeply changed the ways of discovering, proving and finding relationships specifically in geometry.

This study demand change in pedagogical practices which could engage children in learning mathematics which they value. It also throws light on the kind of knowledge teacher need to have for teaching geometry specifically quadrilaterals.